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EVENING AMUSEMENTS;

OR, THE
BEAUTY OF THE HEAVENS
DISPLAYED.
IN WHICH
SEVERAL STRIKING APPEARANCES,
TO BE OBSERVED ON VARIOUS EVENINGS IN THE
HEAVENS,
DURING THE YEAR
1812,
ARE DESCRIBED;
And several Means are pointed out, by which the Time of
Young Persons may be innocently, agreeably, and
profitably employed within Doors.

INTENDED TO BE CONTINUED ANNUALLY.

BY WILLIAM FREND, ESQ. M.A.

ACTUARY TO THE ROCK LIFE ASSURANCE COMPANY, AND LATE FELLOW
OF JESUS COLLEGE, CAMBRIDGE; AUTHOR OF PRINCIPLES
OF ALGEBRA, TANGIBLE ARITHMETIC, ESSAY
ON PATRIOTISM, ETC.

Os homini sublime dedit, cœlumque tueri
Jussit, et erectos ad sidera tollere vultus.

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PURSUING the same plan as in the former volumes, I have in this gone a little farther, and ventured to call in question some points in the modern philosophy, on which the sagacity of my readers may exercise their judgement. To be attached to any system, so as to preclude farther inquiries, does by no means become mortals so weak as we are; and the tenacity, with which the Ptolemaick system was supported, ought to be a caution to those who have embraced that, which has supplanted it. My readers may find, besides, enough to exercise them in the conjecture concerning the siege of

Troy, the distance of the fixed stars, and the extension of their ideas respecting number. The trifling errour in the Nautical Almanack, rectified at the end of this volume, shows how difficult it is in these subjects to guard ourselves entirely from similar mistakes, and will make the reader more indulgent to those that I may have committed. The importance of the nautical stars will, I trust, be considered as a sufficient ground for their occupying so great a share of attention in this volume.

EVENING AMUSEMENTS;

OR, THE

BEAUTY OF THE HEAVENS

DISPLAYED.

TO THE READER.

IT is a satisfaction to an author, who does not write with a view to fame, but merely with a desire of contributing to the improvement and amusement of his readers, to find that his observations are not thrown away; and that they are taken in good part by those who can instruct, and received with pleasure by those who are willing to be instructed. This gratification I have received in the communications made to me on the subject of my last year's volume, and particularly in one from a lady, who has concealed her name, but who will learn from this that her letter has been received; and I am glad to find that the experiment I recommended with the globes has so far succeeded. The reader will, I am persuaded, be pleased with the account in her own words:

"A pair of eighteen inch globes, handsomely mounted, had reposed for nearly two years under their covers in a room not generally used, till we received and read your book for this year, when they were introduced unveiled into the parlour. We find them very useful in affording frequent employment, amusement, and subject for conversation. Two little girls are very happy in being allowed at any time of the day to fix them for the hour, after they have been rectified in the morning, for I suffer them to move the terrestrial globe from west to east, that they may observe the order in which the different countries come under the meridian, and what countries are at the same time in that situation. They take great delight also in reading your description of the appearances of the heavenly bodies for each night in the volume for this year, and of the fixed stars in that for 1806, which always lie in the room."

The same thing has happened, I have no doubt, in many other families; in which, the moment an interest is taken by young persons in the amusements with the globes, their daily proficiency will astonish those, who have seen the tardy progress made in the usual routine of teaching geography*. A child learns its way in a village after a very few walks; and in the same manner, by looking at London on the globe, and marking a few places around, it soon learns their relative situations, and so by degrees obtains a sufficient general knowledge of the whole earth. We may treat them as pigeons, who, by being carried certain distances north, south, east, and west of their homes every day, learn the face of the country: and, when they are carried to a very great distance, on being thrown up, take a round in the air, and direct their way straight to their dovecot. The eyes of children are equally useful to them; and if, on each day, noted places are marked out to them, north, south, east, or west of London, on the globe, they will very soon be able, from any given spot, to trace the way back to London, and note the principal places near the line on which their finger passes. But I reserve this subject to another opportunity.

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* Segnius irritant animos demissa per aures
Quam quæ sunt oculis subjecta fidelibus.

I have to make my acknowledgements to a gentleman of great eminence in his profession, and who, in the education of young men, many of whom are intended for the sea service, employs my little books, for the hint that he has suggested, that they might be made more useful by a more particular description of the stars, which are given in the Nautical Almanack. Young seamen, he observes, who have learned the method of calculating the longitude by lunar observations, are frequently at a loss to discover these stars. To the authority of a gentleman, so skilled in this very important branch of education, I bow with the utmost deference. Many persons are sensible of the advantages they have received under his instructions, and wherever young men are brought up for the sea, it must be of great use, not only to teach them the mode of calculation, but also to point out to them the objects on which these calculations are founded. I had this in view in my other volumes, in which I have occasionally mentioned the Moon's distance at certain hours from some of these stars; but now, for the sake of the young seamen, and particularly those in our navy, I shall make this a peculiar feature in the present volume.

In my last year's volume, I gave an account of the important works published under the inspection of the astronomer royal in England and the directers of the observatory at Paris: the former, under the name of the Nautical Almanack; the latter, under that of the Connoissance des Tems. To our sailers, the Nautical Almanack is of the greatest importance, and for their use, as the title imports, the work is designed, and no one ought to be intrusted with the command of a ship for a distant voyage, who is not perfectly well acquainted with its contents. The great object of the work is, to facilitate the discovery of the longitude of a ship at sea, by means of the Moon's distance from the Sun or certain stars. The operation is performed by a sextant, the use of which is learned in a very short time by a young person on board of a ship; and if nothing more was requisite than to discover the arc between the apparent centre of the Moon and a star, the longitude would give very little more trouble than the latitude from the altitude of the Sun at noon. But this arc, when measured, is the apparent distance only of the centre of the Moon from the star, and the longitude can be calculated by the Nautical Almanack only from a knowledge of the real distance of the Moon's centre from the star. The causes of the variation of the Moon's apparent from its real place shall be shown hereafter. All the knowledge of it will be evidently of no use, unless the young seaman is acquainted with the stars, whose apparent distance from the Moon he is to discover by an accurate observation.

The Moon performs its course round the heavens in a portion of time nearly the same as one of our months. Its orbit is constantly varying: but, by means of combined observations and an improved theory of her motion, her distance from certain stars is calculated for every three hours in the day and night. When I say her distance, I mean the distance of her centre, as viewed by a person, supposed to be fixed in the centre of the earth. A table of these distances occupies four pages of the Nautical Almanack in the account of every month, and the work is published three or four years before the time of using them at sea, that ships bound to remote regions may be provided with them, before they quit this country. Each month has its peculiar catalogues of stars, differing from that of the preceding month by the introduction of new stars, and the removal of some in the former catalogue. In different countries, these stars will be viewed with more or less advantage; and by learning their positions, with respect to other stars, before he goes to sea, a young man will, in every latitude, find them with great facility. Indeed, from the moment he goes on ship-board, he should be attentive to this circumstance; and when he walks the deck at night, he should note the nautical stars, which are above his horizon, and, as he changes his latitude, he will gradually accustom himself to the change in the appearances of the starry heavens.

As the Moon has passed its full in the beginning of the month of January of this year, we will here specify only the nautical stars, that are noted after the new Moon of the 14th. These are, the first of the Ram; Aldebaran; Pollux, or the second of the Twins; Regulus, or the first of the Lion; Spica, or the first of the Virgin; and Fomalhaut. These names have occurred so often in our former volumes, that they must be familiar to the reader; and every mother, whose son is dedicated to the sea, should take every opportunity of impressing them on his memory. It is by repeatedly looking at them, that they will become as familiar to him as the ordinary objects between his home and his school.

The latter star is so near the horizon after Sunset, that in our latitudes observations upon it will not be frequent, and we shall have better opportunities of pointing him out. The Ram and Aldebaran are in very good positions, for they will be on the meridian early in the evening. The first of the Ram is the star, from which, by its being near the meridian, the eleventh position, described in the volume for 1806*, is taken; and of course, by looking at the table of positions at the end of the month, we see nearly the time on which it will be in the meridian every evening. On the 20th and 21st, we have the best opportunities of distinguishing this star; for on these days, at half past five, it is very near the meridian in the south, on the borders of the upper region. The Moon is to the west of it on the first of these days, and to the east on the second, and passes under it at the distance of between fifteen and sixteen degrees. As there is no star of the second magnitude above the Moon within double the distance, we cannot fail of distinguishing it; and the two small stars near to each other on the west of it, mark it so completely, that, after a few times' observation, it will be remembered, in whatever part of the heaven it may be, and in whatever latitude you are observing it.

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* Page 257.

The Pleiades are such a remarkable cluster of stars, that almost every body knows them; and by their being on the meridian, the twelfth position in the volume for 1806* is described. If we look, therefore, to the south, and to the borders of the upper region, on the 20th, about half-past seven, we cannot fail of discovering them, and the two nautical stars, the first of Aries to the west, and Aldebaran to the east of them. Aldebaran is known by being a star of the first magnitude, surrounded by several small stars called the Hyades; and as there is no star of the first magnitude above the horizon so accompanied, you cannot fail of distinguishing him from all others. The young sailer should attend peculiarly to this circumstance, and the recollection, that the Pleiades have on each side of them a nautical star, Aldebaran near to them on the east, and the first of the Ram at some distance on the west, will, in any latitude where they are visible, lead him to discover them. Indeed, it will be a useful question for an instructer to ask his pupil occasionally, namely: What are the two nautical stars nearest to the Pleiades? I shall only observe here, that, in future, the reader will understand, that by a nautical star, I mean a star, by whose distances from the Moon on certain hours, as marked down in the Nautical Almanack, the longitude of a place, where the Moon and that star are visible at the same time, may be discovered.

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* Page 263.

JANUARY, 1812.

THIS is a favourable month for observation on the planets. In the former part of it, the four first are above the horizon at the same time after Sunset; and of these, three of them decorate the western hemisphere. These are Mercury, Venus, and Mars; the two first being distant not a degree and a half from each other, but soon increasing that distance very considerably. Venus making rapid approaches towards Mars. Jupiter is at this time in the eastern hemisphere. Saturn and Herschell are morning stars.

The Moon is on the 1st in the barren region, between the Crab and the Lion; and as she rises in the heavens, we perceive her to be bending her course under the first of the Lion, which star she passes on the morrow. As this is one of the stars of great importance in navigation, the young observer will take particular notice of it; and he cannot forget this star, if he recollects that there are two pointers to it in the Great Bear, with which he is presumed to be well acquainted. These two stars are the fourth and the third, or the two eastern in the oblong of this constellation; and, drawing a line from the fourth through the third, and producing it, he will perceive that it passes through the first of the Lion, the only star of the first magnitude in this direction. At a quarter past eleven, Jupiter is on the meridian; and above the line, between him and the Moon, we cannot fail of recognising the second of the Twins, or of the two bright stars above and near to him. The second is the lowest of the two, and at nine is twenty-seven degrees from the Moon. On the 2d, the Moon rises nearly with the first of the Lion, and during the night will be perceived under and directing its course from it. At nine she is thirty-eight degrees twenty-six minutes from the second of the Twins. On the 3d she rises under the first of the Lion; and on this day passes the ecliptick, or line of apparent path of the sun, in her ascending node: that is, in a direction from the south to the north of this line. During the night, we observe above her the first and third of the Lion, and the small stars in the Lion's head. At nine she is fifty degrees from the second of the Twins.

On the 4th, the Moon arises above the second of the Virgin*, the bright star above and nearest her being the second of the Lion†. The former star suffers an occultation this night, as the Moon's eastern rim touches it at forty-two minutes and a half past eleven, when the star is seven minutes and one third south of her centre; and it emerges at thirty-nine minutes and three quarters past midnight, when it is eight minutes and three quarters south of her centre. At nine she is twenty-four degrees fifty-six minutes from the first of the Lion. On the 5th she rises under the seventh‡ of the Virgin, having passed this star at twenty-eight minutes past five in the afternoon; and they who travel in the night will perceive her progress by the third§ of this constellation, which she passes at nineteen minutes past four in the morning of the 6th. On the 7th she rises early in the morning, being followed by the first|| of the Virgin, and she is perceived to be directing her course towards the tenth¶ of this constellation. This star she passes at four minutes past five in the morning of the 8th, and directs her course to the space between the two first

* β ♍. † β ♌. ‡ ζ ♍.
§ γ ♍. || α ♍. ¶ κ ♍.

stars of the Balance; and the line between them she passes in the morning of the 9th. On the 10th she rises under the third and seventh of the Balance, and is soon followed by the second of the Scorpion; and on the 14th is new Moon, at eighteen minutes past eight in the morning, but without an eclipse of the Sun, as she is upwards of three degrees in her upright north of the ecliptick, or Sun's apparent path in the heavens.

On the 16th, the Moon is seen again, in the west, having under her Venus, and above her the eighth of the Water-bearer. On the 17th, she is perceived to have passed under the four small stars in triangle of the Water-pot, and to be traversing the space in the stream from it near to the ecliptick, which she passed in her descending node in the morning, but, for obvious reasons, without an eclipse. For this and some following nights, the young observer will keep his eyes on Aldebaran, which, at six o'clock, is eighty-four degrees thirty-nine minutes from her on the eastern side of the meridian in mid-heaven. On the 18th we perceive her in a barren space, the four stars in Square being above her; but she does not pass the line drawn along the two eastern stars and produced till after her setting. Her distance from Aldebaran is diminished considerably: at six o'clock she is seventy degrees eight minutes from this star. On the 19th she passes over the meridian at forty minutes past four, having then above her to the east the three first stars of the Ram, and to the west the four stars in Square. At six, she is fifty-five degrees forty-seven minutes from Aldebaran. On the 20th she is on the meridian at thirty-two minutes past five, having above her the three first stars of the Ram, the second and third being very near to, but to the east of the meridian. At six she is forty-one degrees thirty-nine minutes from Aldebaran.

On the 21st the Moon is on the meridian at twenty-three minutes past six, having above her the three first stars of the Ram to the west, and below her Menkar, and the stars in the head of the Whale, to the east of the meridian. She is to the east of the line drawn between the first of the Ram and Menkar, as she passed the twelfth of the Whale, the highest of the three small stars in his head, half an hour before. At six she is twenty-seven degrees and three quarters from Aldebaran, who, with the Pleiades above, and

Orion below him, will attract notice. On the 22d she is on the meridian at a quarter past seven, being directly under the Pleiades; but above the line drawn between Menkar and Aldebaran, the former below her to the south, the latter above her: to the east of the meridian, is the latter, to which she is evidently directing her course. Jupiter is considerably to the east of her. At six, she is fifty-eight degrees forty minutes from the second of the Twins. On the 23d, she is on the meridian at seven minutes past eight, and is passing very near to Aldebaran; and the progress towards this star before this time, and by and from her afterwards, sufficiently marks it to the commonest observer, who, noticing it on this night, cannot fail, hereafter, of remembering it. The Pleiades on one side, and the bright constellation of Orion below her, on the other, mark this star with sufficient distinction from any other of the same magnitude. At six, she is forty-five degrees thirty-five minutes from the second of the Twins to the east, and thirty-four degrees forty-nine minutes from the first of the Ram to the west of her. On the 24th she is on the meridian at fifty-nine minutes past eight, being under the two horns of the Bull and above Orion, having the third and second of this latter constellation almost directly under her, and almost directly above her, and in this order, the sixth and second of the Bull and Capella. Aldebaran to the west, and Jupiter to the east of her, will attract notice. At six she is sixty-seven degrees thirty-four minutes from the first of the Lion, and forty-seven degrees three minutes from the first of the Ram.

On the 25th the Moon is on the meridian at fifty-two minutes past nine, having above her the twelfth and seventh of the Twins, and Jupiter near to but to the west, and the third of the Twins below her to the east of the meridian. Her progress from Jupiter will be interesting from her first appearance. Orion is now below her to the west, and Sirius, with the stars in the Great Dog, much lower to the east of the meridian. At six, she is twenty-five degrees thirty-five minutes from Aldebaran; and at nine, fifty-two degrees fifty-six minutes from the first of the Lion. On the 26th she is on the meridian at forty-three minutes past ten, having above her the two first stars of the Twins, and below her the two first stars of the Lesser Dog, the first of the former and the second of the latter constellation being almost in the direct line with her. Jupiter is now very considerably to the west of her.

At six, she is thirty-eight degrees twenty-five minutes from Aldebaran; and at nine, forty-degrees eight minutes from the first of the Lion. On the 27th she is on the meridian at thirty-three minutes past eleven, being in the barren region of the Crab, in a line nearly with the two first stars of the Twins above her to the west, and the small stars in the head of the Hydra below her to the east of the meridian: at six, she is fifty-one degrees three minutes from Aldebaran; and at nine, twenty-seven degrees thirty-three minutes from the first of the Lion.

On the 28th is full Moon, at thirty-eight minutes past eleven, but without an eclipse, as she is nearly two degrees and three quarters in her upright south of the ecliptick. During her appearance above the horizon, she is perceived to be passing the dreary space between the Crab and the Lion, continually bending towards the ecliptick, and diminishing her distance from the first of the Lion to the east of her. At nine, she is sixty-five degrees two minutes from Aldebaran. On the 29th she is followed soon after her rising by the first of the Lion, which star she does not pass till after midnight, but her progress by it will fix the attention of the observer. At nine, she is seventy-seven degrees sixteen minutes from Aldebaran. On the 30th she rises under the first and third of the Lion, and before she sets passes the ecliptick, but, for evident reasons, without producing an eclipse. At nine, she is forty-six degrees eighteen minutes from the second of the Twins. On the 31st she rises soon after the second of the Lion, and is followed by the second of the Virgin: the constellation of the Lion above her will claim our attention. At nine, she is fifty-seven degrees fifty-five minutes from the second of the Twins.

Mercury is an evening star, to be seen on the 1st in the south-west, as he does not set for nearly an hour and three quarters after the Sun, decreasing his duration above the horizon every night. They who have a south-western aspect may have many favourable opportunities of seeing him. He is stationary on the 5th, and will then have attained his nearest approach to the two first stars of the Goat, from which he afterwards recedes, and he is then near to the ecliptick. His inferior conjunction is on the 15th, and of course he is invisible in the middle of the month; and at the latter part he is a morning star, to be seen a little before Sun-rise; at which time, on the last day, he is only ten degrees above the horizon at Sun-rise. He is stationary on the 26th, and the Moon passes him on the 14th.

Venus is an evening star, traversing this month the constellation of the Goat and the Water-bearer. Her duration above the horizon after Sun-set on the 1st, is not so long as that of Mercury, from whom she is not distant a degree and a half; and consequently, if a favourable night, these two planets must attract our attention in the south-west. Venus travels much the most rapidly, and the distance between them is increased by the 5th considerably; and much more after that time will the distance increase daily, as they then travel in opposite directions. On the 2d Venus passes the line drawn through the two first of the Goat and produced, and she directs her course to the third and fourth of this constellation, the two uppermost of the four small stars in the tail. As her duration above the horizon increases every night, we shall enjoy many opportunities of seeing this beautiful planet. The region she passes through is very barren till she approaches the third of the Goat, which she passes on the 16th, the star being fifty-five minutes south of her; and on the 17th she passes the fourth, this star being fifty-seven minutes south of her. She recedes fast from these stars, directing her course to the twenty-first of the Water-bearer, the star on the eastern bank of the stream, but she does not reach the western bank this month, in which she moves through nearly forty degrees. The Moon passes her on the 16th.

Mars is an evening star, passing over the meridian at three minutes past four in the afternoon of the 1st, and earlier every day; so that his duration above the horizon after Sun-set is daily decreasing. On the 1st he is seen within the stream of the Water-pot, to the east of the eleventh of the Water-bearer, and he directs his course to the twenty-first, which he passes on the 7th, the star being eighteen minutes south of him. He now travels through a very uninteresting region, under the four stars in Square, finishing his course near the line drawn through the two eastern of these stars and produced. Mars is at too great distance from Venus and Mercury to increase the interest we take in observing these planets, but he adds much to the splendour of the western hemisphere; and, when Mercury has retired from our contemplations; we shall notice the daily diminution of distance between Venus and Mars. The Moon passes the latter on the 18th.

Jupiter passes the meridian at a quarter past eleven at night of the 1st, and three quarters past nine of the 19th. He is therefore in a fine situation early in the evenings. He recedes slowly from the seventh of the Twins, with a retrograde motion through three degrees and a half. As on the 1st he is very near the spot where the Sun is on the longest day, his duration above the horizon is nearly equal to that of the Sun at that time. We cannot fail of noticing the seventh and twelfth of the Twins when we are observing him, these two stars being the nearest to him, the twelfth being the most remote of the two. The eclipses of his satellites at ten at night will be, of the first, on the 5th, the 12th, and the 28th; of the second, on the 14th; and of the third, on the 9th. The Moon passes him on the 25th.

Saturn is a morning star, too near the Sun to be noticed early in the month, but towards the middle he will begin to be distinguished in the south-east, near the horizon. He is considerably to the west of the small stars in the head of the Archer. The Moon passes him on the 12th.

Herschell is on the meridian at half past eight in the morning on the 1st, and nineteen minutes past seven of the 19th, rising not till after midnight during the whole month. He will be found by drawing a line between the first of the Balance and the second of the Scorpion, and taking a point a little more than half way from the former star. When on the meridian on the 1st, he is directly under the small stars called the sixth of the Balance; and he moves very slowly from that point, his motion being direct through little more than a degree.

The Sun's apparent diameter on the 1st is thirty-two minutes thirty-five seconds, and on the 18th thirty-two minutes thirty-four seconds. The Moon's apparent diameter decreases to the 5th, when it is twenty-nine minutes thirty-eight seconds; then increases to the 16th, when it is thirty-two minutes fifty seconds: from which time it decreases to the end of the month, being then twenty-nine minutes thirty-eight seconds.

For the appearances of the fixed stars at any time of night, consult the volume for 1806, by the following table. The first column indicates the number of the position described at the end of that volume, and the other columns the hour at which the stars in that position are to be observed.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
X.	4	43	4	12	3	38		
XI.	6	44	6	13	5	39	5	5
XII.	8	50	8	19	7	45	7	11
I.	10	40	10	9	9	35	9	1
II.	0	43	0	12	11	38	11	4
III.	2	32	2	1	1	27	0	53
IV.	4	53	4	22	3	48	3	14
V.	6	44	6	13	5	39	5	5
VI.			8	9	7	35	7	1

FEBRUARY, 1812.

THE nautical stars this month are the first of the Ram, Aldebaran, Pollux, Regulus, Spica, and Antares. The two first, you remember, have between them the Pleiades, and this month is favourable for the noting of them, as these small stars are on the meridian at thirty-eight minutes past six in the evening of the 1st; and of course will, in the former part of it, be on the meridian at a time, when any one, having a window to the south, may see them to advantage. You will read over again what is said in page 8, and observe the different appearances of the three first stars of the Ram, as they are descending to the horizon. On the 16th and 17th the progress of the Moon by the first of Aries*, or the Ram, will point this star out completely; and I apply the term Aries, because it is so used in the

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* α Aries.

Nautical Almanack. It is merely the Latin word for a Ram, and can easily be remembered.

Aldebaran you will distinguish to the west of the Pleiades, when these stars are on the meridian; and at a later hour this, with another nautical star, will call your attention in a different position. The time for this observation is when the fifth of Orion is on the meridian, and consequently this splendid constellation is seen to the greatest advantage. The appearance of the heavens at this time is described in the first position*; and as on the 1st of the month it takes place at half past eight, and, as may be seen in the table at the end of this month, at an earlier hour every succeeding night, sufficient opportunities will be afforded to mark the two nautical stars, Aldebaran and the second of the Twins, at very convenient times. Aldebaran will be now distinguished by being between the Pleiades and Orion, and this feature will be remembered when you look for it in any other latitude.

The other nautical star is the second of the

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* Vol. for 1806, page 168.

Twins; and a slight view of the eastern hemisphere, at this time, will show that this star cannot easily be mistaken. The two first stars of the Twins are of the second magnitude, near together, and we have other pairs of bright stars near together, but differing from them in appearance. Thus there are two pairs of bright stars in the Great Bear, but the seven stars of this constellation are so well known, that you cannot look to that for the two first stars of the Twins. The two first stars of the Great Dog form a pair, which might be mistaken for the Twins; but one of them, Sirius, being the brightest in the heavens, prevents us from falling into such an errour. The two stars of the Lesser Dog more nearly represent the Twins; but one of them is a star of the third magnitude, and consequently you cannot be under any mistake with them. These are the only pairs in the eastern hemisphere, which can occasion doubt; and by examination of them in these, there will be no fear of mistaking them in other latitudes.

When Orion and the Great Bear are visible above the horizon, the two first stars of the Twins, being the bright pair between them, cannot be mistaken; and if the first of the Lion and

Aldebaran are above the horizon, the Twins must be known as being above the line between them; and at this time we must distinguish the first of the Lion, as it is the only star of the first magnitude in the east. Thus we have sufficient marks to distinguish the Twins during this month, at the hours marked in the table at the end of the month for the first position; and, on knowing them now, you must take care to distinguish the nautical star, which is the second, or, as it is called in the almanack, Pollux. The two stars called the Twins were distinguished by the names of two heroes of former times, called Castor and Pollux, who were raised by wretched superstition into the rank of gods, and worshipped by a deluded age. You will remember to have read their names in the holy scriptures, as the apostle Paul performed a voyage in a ship which bore this name, and probably their images were in the ship, with each a star on his head. The lowest of these stars is, in this position, our nautical star; but this is not a sufficient mark, as it may be visible, when, instead of being the lowest, it is the highest star; and we must look for a better distinction in the heavens themselves; and as one of these three stars, Aldebaran, Capella, and the first of the Lion, will be visible, when we wish to distinguish between the Twins, we cannot fail in any latitude of remembering which is which, by recollecting that the nautical star is farthest from Aldebaran and Capella, but nearest to the first of the Lion.

We cannot any where mistake the Twins for Capella and his companion, since the two latter stars are not only at a greater distance from each other, but one of them is of the first magnitude. The intended sailer will do well, when he has discovered the Twins by the direction I have given, to figure to his mind how they will appear in different latitudes at different times; and if he has the opportunity of consulting globes, he will place them in the proper situations for every latitude, and then notice how the Twins will appear to him. Thus he will never be at a loss, when the nautical star of them appears, and indeed the knowledge of one nautical star is a great guide to that of the adjacent ones. The second of the Twins will be remembered to be the nautical star between Aldebaran and the first of the Lion; and in every part of the world these stars are of such a marked character, that, with the distinguished character also of the Twins, there can be no fear of mistaking them. I may observe, also, that the young sailer is prepared for them by their coming in succession under his observation, as he is walking the deck: and by considering in the morning what nautical stars will be at night above the horizon, he will be duly prepared to discover them.

Three planets decorate our skies in the evenings of this month, Venus, Mars, and Jupiter: the other three are morning stars. In the beginning of the evening, Venus and Mars are in the western, and Jupiter in the eastern hemisphere. The two former will be frequently compared together, and in advantageous positions; and we shall notice the daily diminution of distance between them, but Mars is not overtaken this month.

On the 1st, the Moon rises under the second of the Virgin; and as she ascends the heavens we mark her progress by the seventh of this constellation, which she passes at nearly an hour after midnight. From her present direction, we perceive that she will pass the first of the Virgin at a considerable distance from the star. On the 2d she rises under the five stars in triangle of the Virgin, but nearest to the third, being followed by the first of the Virgin; which star will be marked by its superior brightness to any in that district. On the 3d, she follows the first of the Virgin in rising; and during the night of the 4th, we may note its increasing distance from that star. On the 5th she rises, in the morning, under the tenth and eleventh of the Virgin, and is soon followed by the two first stars of the Balance, being nearest to the first; but she does not reach the line between these two stars before her disappearance. On the 6th she rises under the two first stars of the Balance, and is perceived to direct her course towards the third of the Balance, which suffers an occultation at nineteen minutes and a quarter past four in the morning, the star being five minutes north of the Moon's centre, and the star reappears at thirty minutes and a half past five; being then seven minutes and a half north of the centre.

On the 7th the Moon rises at the same time nearly with the second of the Scorpion, and will form with that star and Antares a triangle, whose varying sides the traveller will notice. Saturn is at a considerable distance from her to the east. On the 8th she rises nearly with Antares, and her recess from this star and approach towards Saturn will command attention. On the 9th she is followed soon after her rising by Saturn; and to the east of her, before Sun-rise, we may, if the morning is clear, discover Mercury. On the 10th she is seen midway between Mercury and Saturn, at nine minutes past five; the star called *d* of the Archer, a small star to the east of those in his head, suffers an occultation, being then four minutes and two thirds south of the Moon's centre; and it emerges at eleven minutes and three quarters past six, being then half a minute south of the centre; and, on the 11th, her crescent will be seen, before Sun-rise, between Mercury and the two first stars of the Goat. On the 12th is new Moon, at eight o'clock at night, at which time there is an eclipse of the sun; but of course invisible to the inhabitants of this country.

On the 14th the crescent of the Moon is seen under Venus, and forms with that planet a beautiful object in the west-south-west, soon after Sun-set, Mars being considerably above them. On the 15th we perceive that she has travelled considerably from Venus, and has passed the line drawn through the two eastern of the four stars in Square and produced: Mars is still above her. Above her, at a considerable distance, are the three first stars of the Ram; and at six we may extend our views to Aldebaran still farther eastward, from which star she is distant sixty degrees twenty-seven minutes. On the 16th she is seen under the three stars of the Ram, and, at nearly equal distances from the first of this constellation and Menkar, the first of the Whale; between which she is directing her course, but nearest to the latter star: Mars is now below her. At six she is forty-five degrees and three quarters from Aldebaran. On the 17th she is on the meridian at a quarter past four, having above her, to the west, the three first stars of the Ram; and below her, to the east, Menkar, and the small stars in the head of the Whale: but she does not pass the line between the first stars of this constellation before she sets. At six she is thirty-one degrees twenty-two minutes, and at nine, twenty-nine degrees thirty-five minutes, from Aldebaran. On the 18th she is on the meridian at eight minutes past five, being between the Pleiades and Menkar; the former above her to the east, the latter below her to the west of the meridian: Aldebaran with the Hyades on the east, and the three first stars of the Ram on the west, complete the groupe around her, which, having Jupiter to the east of it, and Venus and Mars to the west, gives, when the Sun is lower under the horizon, a splendid treat to the observer, who from it also casts his eyes to Orion and Sirius in the south-east. At six she is sixty-one degrees fifty-two minutes, and at nine sixty degrees eleven minutes, from the second of the Twins.

On the 19th the Moon is on the meridian at one minute past six, having the Pleiades above her to the east, and Aldebaran below her to the west; and to this last star she is evidently directing her course. At this time one of the Hyades is suffering an occultation. This is the largest of them, and is known by the name of the third of the Bull. The eastern limb of the Moon touched it at one minute past five, when it was seven minutes north of the centre; and it emerges at twelve minutes past six, being then five minutes and a quarter north of the centre. Her progress afterwards by Aldebaran, which she passes at thirty-six minutes after midnight, will amuse the spectator, who cannot fail, when she is on the meridian, of comparing together Jupiter to the east, and Mars and Venus considerably to the west of her. At six she is forty-eight degrees thirty-four minutes, and at nine forty-six degrees fifty-seven minutes from the second of the Twins. On the 20th she is on the meridian at fifty-four minutes past six, having to the east of it, above her, the two stars in the Bull's horns, and below her Orion. The groupe formed by Aldebaran with the Hyades, the Pleiades, the three first stars of the Ram, and Menkar, is now entirely to the west of her, and the planets to the west of it, with Jupiter to the east of her, make this evening's view very splendid. At six she is seventy degrees thirty-two minutes, and at nine sixty-eight degrees fifty-four minutes, from the first of the Lion; and at the latter hour, fifty-eight degrees eight minutes from the first of the Ram. On the 21st she is on the meridian at forty-seven minutes past seven, being now under the seventh and twelfth of the Twins. Jupiter is to the west of her, above Orion; and the western hemisphere is now glittering with three planets, Sirius giving lustre to the eastern hemisphere near the meridian. At six she is fifty-seven degrees thirty-two minutes, and at nine fifty-five degrees fifty-six minutes, from the first of the Lion.

On the 22d the Moon is on the meridian at thirty-nine minutes past eight, the two first stars of the Twins being above, and the two first of the Lesser Dog below her to the east, and Sirius below her to the west of the meridian. Venus is now lost to the groupe of the preceding evening. On the 23d she is on the meridian at twenty-nine minutes past nine, the two first of the Twins being above her, and the two first of the Lesser Dog below her to the west, and the small stars in the Hydra below her to the east of the meridian. At six she is thirty-two degrees eighteen minutes from the first of the Lion to the east, and forty-seven degrees fifty-two minutes from Aldebaran, to the west of her; and at nine thirty degrees and three quarters from the former, and forty-nine degrees twenty-five minutes from the latter of these stars. On the 24th she is on the meridian at seventeen minutes past ten, having directly under her the small stars in the head of the Hydra, and above her to the east the small stars in the head of the Lion, below which we of course distinguish the first. At nine she is sixty-one degrees forty-four minutes from Aldebaran. On the 25th she is on the meridian at four minutes past eleven, being directly under the small stars in the head of the Lion, the first being near to her on the east; and her progress under this star during the night will be noticed. At nine she is seventy-three degrees fifty-four minutes from Aldebaran.

On the 26th the Moon is on the meridian at forty-nine minutes past eleven, the first and third of the Lion being now to the west, and the fourth, and eighth, second, to the east of the meridian. She passed the seventeenth at fourteen minutes past ten, and before she sets suffers an eclipse, as she passes the eclliptick in her ascending node, in the morning of the 27th. The eclipse begins at fifty-four minutes past three, and the total darkness at fifty-nine minutes and a half past four, ending at forty-four minutes and a half past six; and the end of the eclipse is at fifty minutes past seven. The digits eclipsed are 20° 40′ from the south side of the Sun's shadow. As the Moon sets at forty-nine minutes past six, the end of total darkness will not, from her being so near the horizon at that time, be easily distinguished; and, of course, the remainder of the eclipse will be lost to us. At night she rises nearly with the second of the Lion; and is perceived to be, during the former part, under this constellation, directing her course towards the second of the Virgin. On the 28th she rises under and near to the second of the Virgin;

whose lustre, with that of the others of the five stars in triangle, will be overwhelmed by her superior splendour. At nine she is twenty-nine degrees forty-one minutes from the first of the Lion. On the 29th she rises under the third of the Virgin, having passed this star at forty-one minutes past six; and during the former part of the night we notice under her the first of this constellation. At nine she is forty-one degrees and a half from the first of the Lion.

Mercury is a morning star during the whole of this month, being at his greatest elongation on the 7th. In the former part of the month he will be noticed in the south-east as the bright harbinger of day; being, however, from his position and small northern latitude, near to the horizon. He is moving from the small stars in the head of the Archer, to the east of which he is on the 1st, directly towards the two first stars of the Goat; which he passes on the 15th, being five degrees below them. Saturn, to the west of him, will more frequently excite our attention. The Moon passes Mercury on the 10th.

Venus is an evening star, adorning the west-south-west, and shining with considerable splendour. The contrast between her and Mars, first at a considerable distance from her, but which daily diminishes, will excite our attention. She moves with a direct motion through about thirty-six degrees; being, at first, near a degree and a half to the south of the eclipticle, which diminishes to less than half a degree. On the 1st she is near the western border of the stream from the Water-pot; and she passes the twenty-first of the Water-bearer, on the eastern border, on the 5th. Thence she proceeds through the barren space under the western of the Fishes, and reaches the line passing through the two eastern of the four stars in Square, on the 20th. She finishes her course near to, and under, the small stars in the band of the Fishes. The Moon passes her on the 14th.

Mars is an evening star, who with Venus adds to the interest of the western hemisphere; and his duration above the horizon after Sun-set is considerably longer. On the 1st he is seen near the line passing through the two eastern of the four stars in Square, which he has passed; and thence he advances with a direct motion through about twenty-one degrees, passing, on the 20th, the sixth of the Fishes, this star being ten minutes to the south of him; and he finishes his course without reaching the band from the eastern fish, under the three first stars of the Ram. The distance between him and Venus, below him, we perceive to be every day diminishing, as is his from Jupiter, at a considerable distance from him to the east. The Moon passes him on the 16th.

Jupiter is stationary on the 21st, having a retrograde motion to that day, and of course afterwards direct, but of course both very slow. The former is little more than half a degree. On the 1st he is on the meridian at forty-eight minutes past eight, Venus at this time being under, and Mars very near to the horizon. On the 19th he is on the meridian at thirty-five minutes past seven, when both the other planets are above the horizon, Venus near to, but Mars at some height above it, near the west. From this day, the opportunities of comparing together the three planets improve considerably, though the position of the Moon impairs them; and Jupiter being earlier every night upon the meridian, we may, between six and seven, enjoy the sight of the three planets and four stars of the first magnitude, Aldebaran, the two stars of Orion, and Sirius; these stars being on, or bordering on, the meridian. Jupiter, when on the meridian, has Orion directly under him, Aldebaran below him to the west, the two first stars of the Twins above him to the east; and from him, the line to the western point directs our attention to Aldebaran, with the Hyades, the Pleiades, the three stars of the Ram, Menkar, with the small stars in the head of the Whale, Mars, and Venus. The Moon, having passed these objects, passes Jupiter on the 21st.

Saturn is a morning star, whose duration above the horizon before Sun-rise is daily increasing. We see him on the 1st in south-east by south, about ten degrees above the horizon, having below him the eleventh, and above him the twelfth of the Archer, being to the east of the line between these two stars. He moves with a direct motion through a little more than two degrees and a half, just clearing the eastern border of the Milky-way at the end of the month, the small stars in the head of the Archer being at some distance to the east of him; and Mercury, on the other side, will, with him, give an interest to the lower part of the lower region in the south-east.

Herschell is a morning star, stationary on the 26th, having a direct motion to that day of only a quarter of a degree. He is on the meridian on the 1st at half past six, and on the 21st at seven minutes past five, being then almost directly under the third of the Balance, the tenth being about a degree and a quarter from him to the east. The Moon passes him on the 6th.

The apparent diameter of the sun on the 3d, is thirty-two minutes and a half, and on the 19th thirty-two minutes twenty-four seconds. The Moon's apparent diameter increases to the 13th, when it is thirty-three minutes eighteen seconds: from which time it decreases to the end of the month, being then twenty-nine minutes and a half.

The following table points out the positions of the stars which are seen at certain hours in the evening. These positions, according to the numbers in the first column, are described at the end of the volume for 1806; and the figures in the other columns mark the time when they are to be seen on the days marked by the figures at the head of each column.

TABLE OF POSITIONS.

Pos.	1		8		15		22	
	h.	m.	h.	m.	h.	m.	h.	m.
XI.	4	32	4	4				
XII.	6	38	6	10	5	42	5	15
I.	8	28	8	0	7	32	7	5
II.	10	31	10	3	9	35	9	8
III.	0	20	11	52	11	24	10	57
IV.	2	41	2	13	1	45	1	18
V.	4	32	4	4	3	36	3	9
VI.	6	28	6	0	5	32	5	5

MARCH, 1812.

THE nautical stars of this month are Antares, the first of the Eagle *, Aldebaran, the second of the Twins, the first of the Lion, and first of the Virgin. Of these, I shall call your attention more particularly to the three last, presuming that you are now perfectly well acquainted with Aldebaran, and considering that, in the former part of the night, the two first are not well placed for observation. Most of our nautical stars are zodiacal, that is, stars in or near to the zodiack, the band going round the heavens, in which the motions of the Sun, Moon, and planets are performed. Hence it is, that the young sailer has another help to his memory in the knowledge of these stars: for when he is walking the deck at night, by the day of the month, he will know the sign in which the Sun is, and consequently the sign that is opposite to it in the heavens, on a

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* α Aquilæ.

part then above his horizon. Near that situation will be very frequently a nautical star on each side in the zodiack, and, if they are both visible, he will find no difficulty in recognising them; and if the nautical stars are not zodiacal, but at a great distance from the zodiack, this very circumstance is a ground for his discovering them. It will be an amusing exercise to put questions of this kind to a young learner, giving him the day of the month and the hour of the night, and thence calling on him to name the nautical stars that are above his horizon in any latitude.

In the early part of the month, between seven and eight of the evening, we shall see four nautical stars to great advantage. Orion is then to the west of the meridian, Aldebaran and the second of the Twins are at nearly equal distances on each side of it, the first to the west, and the other to the east of it, and beyond them are, to the west of Aldebaran, the first of the Ram, and, to the east of the Twins, the first of the Lion. The stars in this situation should be frequently contemplated, and at another hour we have them in a different situation, and one on which the second position in the volume for 1806 is founded*.

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* Page 181.

This gives us the Twins on the meridian, the first star on the west, the second, our nautical star, on the east. Below them are the first and second of the Lesser Dog, in which you will perceive a manifest difference from the Twins. As this appearance takes place at nearly three quarters past eight, you may have the advantage of contemplating it every night, and thus fixing four nautical stars completely in your memory.

In the western hemisphere, Aldebaran and the first of the Ram must be easily distinguished from all other stars: the former, in the lower region in the west, is known by its accompanying two small stars; and Aldebaran, in the lower part of the upper region, in west-south-west, by its magnitude and small stars around it. The nautical star to the east cannot be mistaken, since there is no other star of the first magnitude but Arcturus in the visible part of the eastern hemisphere. Arcturus is near the horizon, and of much superior brightness; and besides, it is near the line drawn through the two stars in the eastern extremity of the tail of the Great Bear and produced. His very great distance from the Twins also prevents your taking it for the first of the Lion. This latter star, besides being known by its magnitude, will farther be distinguished by being near the line passing through the third and fourth stars of the Great Bear; but, in fact, it is quite sufficient to remember, that it is a star of the first magnitude, nearest to, and to the east of the Twins. By looking at it a few nights, and remarking the star of the second magnitude near it, and the small stars in the head of the Lion, you will form such a picture in your mind, that you cannot take any other star for this nautical star in any part of the world. You will remember, also, that the nautical stars nearest to the Twins are, Aldebaran to the west, and the first of the Lion to the east.

During this month, the third position, described in the volume for 1806*, is a favourable time for observation, as at the latter end of the month the stars on which it is founded are on the meridian at nearly nine at night, and the nautical star, the first of the Lion, is then near the meridian to the east. In this case, Aldebaran and the Twins are in the western hemisphere, and the first of the Virgin in the eastern, near the horizon. The first of the Lion cannot now be mistaken, and the marks for distinguishing the first of the Virgin are easy. For first it is a star of the first magnitude, and it cannot be mistaken for Arcturus, as it is so much inferior in brightness. Arcturus also is accompanied by other stars; but the first of the Virgin is in a barren space. Besides, above the first of the Virgin are the five stars in triangle, and these are such a particular feature, that this nautical star cannot in any climate be mistaken.

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* Page 191.

You will, therefore, in this month, have sufficient opportunities of remarking, first, the two nautical stars to the west, and one to the east of the Twins; and, at a later hour, the two nautical stars to the west, and one nautical to the east of the first of the Lion. You may now suppose to yourself, that you were in the Pacifick Ocean, walking the deck of the ship, in March, and you wished to know what nautical stars would be perceived in the evening. You would recollect that, in spring, the Sun is in or near the first sign, and consequently at Sun-set the point of the seventh would be rising, and therefore the first point of the third sign near the meridian. This would bring to your recollection the nautical star in the Twins, which is in the fourth sign; and you would therefore expect to see, first, the second of the Twins and Aldebaran, on opposite sides of the meridian; and to the east of the former, and west of the latter, the first of the Lion and the first of the Ram. As the latter star declined, you would expect to see the first of the Virgin rising; but make due allowance for the appearances, according to the latitude of your ship.

Three of the planets present themselves for observation in the evening, Venus, Mars, and Jupiter; and the passage of Venus by Mars is the principal feature, and will engage much attention. Jupiter is with these planets in the western hemisphere at Sun-set, at the end of the month. Saturn and Herschell are morning stars. Mercury is first a morning, and afterwards an evening star.

The Moon rises, on the night of the 1st, under the five stars in triangle of the Virgin; and is followed soon after by the first of this constellation. At nine she is fifty-three degrees twenty minutes from the first of the Lion. On the 2d she rises with the tenth and eleventh, directing her course to a point between the first and second of the Balance. On the 3d she rises with the two first stars of the Balance, having passed the line between them; but she is much the nearest to the first. On the 4th she rises under the two first stars of the Balance, and is followed quickly by the twenty-first, which she passes at twenty-four minutes past eleven; and thus heads the stars in the Scorpion, during the morning of the 5th. On the 6th she rises in the morning, nearly with Antares, and is directing her course above Saturn, who, being considerably to the east of her, does not follow her rising for some time. On the 7th she is perceived to have advanced considerably towards Saturn, and on the 8th she rises a little before him, and her passage from him will attract attention. She is followed soon after her rising by the small stars in the head of the Archer. On the 8th she rises soon after Saturn, and is directing her course under the two first stars of the Goat; but she is seen on the 9th not to have attained to them, but on the 10th to have passed them. On the 12th she passes the ecliptick in her descending node; and on the 13th, at twenty-two minutes and twenty seconds after six in the morning, is an eclipse of the Sun, which is not visible in this country. The conjunction is at twenty-two minutes twenty seconds past six in the morning, when the Sun's longitude is 11ˢ 22° 34′; and the Moon's latitude, or distance, in her upright south of the ecliptick, is 1° 19′ 20″.

On the 14th the crescent of the Moon is seen in the west under Venus and Mars, being at some distance from them both, who are under the three first stars of the Ram. On the 15th we perceive that she has made great progress since the last night, as she is now so near to Venus, not being five degrees from her. The two planets, with her, are under the line between the three first stars of the Ram and Menkar, and, with these stars, form an interesting object. On the 16th we perceive her to have advanced considerably beyond the two planets, which, with the stars in the head of the Ram, are now below her, as the Pleiades and Aldebaran are above her, and it is evident that her course is directed through the Hyades. On the 17th we perceive her under the Hyades and Aldebaran, and her progress indicates that she will soon pass by one of the Hyades; and, in fact, she passes the third of the Bull before one in the morning following. At nine she is fifty degrees fifty-nine minutes from the second of the Twins, between which star and the Moon we cannot fail of distinguishing Jupiter. On the 18th she is under the tips of the Bull's horns, and above Aldebaran and the Hyadēs. Jupiter is above her, and the western hemisphere, at seven o'clock, is particularly brilliant, having four stars of the first magnitude, three planets, and the Moon in its southern quadrants. At nine she is seventy-two degrees thirty-five minutes from the first of the Lion.

On the 19th the Moon is on the meridian at forty-eight minutes past five, Jupiter being now above her; and, when the sun permits us, we shall perceive her between this planet and the first of Orion, above the groupe formed by the stars in the Bull, the Ram, and the Whale; and the planets Mars and Venus now near to each other. At nine she is fifty-nine degrees sixteen minutes from the first of the Lion. On the 20th she is on the meridian at forty-one minutes past six, Jupiter being at some distance from her, and the third of the Twins near to her on the west. Directly under her is Sirius. At nine she is forty-six degrees twenty minutes from the first of the Twins. On the 21st she is on the meridian at thirty-two minutes past seven, and at this time the line drawn from her to the west will present to us Jupiter, the stars in the Bull, Ram, and Whale; but, above all, Venus and Mars, passing each other very nearly. Above her is the second of the Twins, and below her the first of the Lesser Dog. At nine she is thirty-three degrees and three quarters from the first of the Lion. On the 22d she is on the meridian at twenty-two minutes past eight, having below her the small stars in the head of the Hydra; and above her the third and fourth of the Crab, with the intermediate nebula to the east of the Lion, attract our attention; and at nine she is seventy-five degrees six minutes from the first of the Virgin, near the horizon, in the east-south-east.

On the 23d the Moon is on the meridian at nine minutes past nine, being under the tenth and eleventh of the Lion, two small stars in his mouth. The fourteenth and fifteenth are near to her on the east, as she passes the former star at forty-six minutes past ten, the latter star five hours and a half afterwards. Of course the first of the Lion will be to the east of her the whole night. At nine she is sixty-three degrees two minutes from the first of the Virgin. On the 24th she is on the meridian at fifty-four minutes past nine, the first of the Lion being near to but to the west of her, and her passage from this star, since its first appearance, will have amused us. The third of the Lion is now directly above her, the seventh above the first to the west of the meridian. She is evidently directing her course to the second of the Virgin; and at nine is fifty-one degrees seven minutes from the first of this constellation. On the 25th she is on the meridian at thirty-eight minutes past ten, having above her the eighth and fourth of the Lion near to it on the east; and the second of course farther from it, the first being removed to some distance on the west. On this day she passes the ecliptick in her ascending node, but, for evident reasons, without producing an eclipse. The second of the Virgin she will evidently pass tomorrow; and at nine she is thirty-nine degrees nineteen minutes from the first of this constellation, and fifty-one degrees thirty-five minutes from the second of the Twins. On the 26th she is on the meridian at twenty-one minutes past eleven, being between the second and the seventh of the Virgin; the former to the west, the latter to the east of the meridian. On this night the former suffers an occultation, as the eastern rim of the Moon touches it at seventeen minutes and a quarter past nine, the star being fourteen minutes and a half south of the centre; and it emerges at thirty-three minutes twenty seconds past nine, the star being fourteen minutes twenty-four seconds south of the centre. At nine she is twenty-seven degrees thirty-nine minutes from the first of the Virgin, and twenty-six degrees thirty-four minutes from the first of the Lion.

On the 27th the Moon rises under the seventh of the Virgin, and passes by the third within an hour after she has passed the meridian, which is not till after midnight; and, of course, she is near the full at her rising: and it is full Moon at sixteen minutes after midnight, but without an eclipse, as she is then two degrees thirty-four minutes in her upright north of the ecliptick. We notice to the east of her the first of the Virgin; and at nine she is thirty-eight degrees twenty-three minutes from the first of the Lion. On the 28th she rises under the five stars in triangle of the Virgin, the third being the nearest to her, and is followed by the first of the Virgin. They are upon the meridian nearly at the same time. At nine the Moon is fifty degrees fourteen minutes from the first of the Lion. On the 29th she rises soon after the first of the Virgin, and is soon followed by the tenth, as she passes this star soon after her passage over the meridian.

At nine she is sixty-two degrees seven minutes from the first of the Lion. On the 30th she is followed, soon after her rising, by the two first stars of the Balance, being much the nearest to the first; and she passes the line between them before Moon-set. On the 31st she rises under the third of the Balance, as she passed this star at seventeen minutes past seven; and at forty-two minutes past eleven, she passes the seventh, but the eighth not till day-break. The stars of the Scorpion following her will attract our notice.

Mercury is a morning star till the 24th, when he is in his superior conjunction, and of course, in the latter part of the month, he could not be expected to be visible; and in the former, from his unfavourable position, he eludes our enquiries. On the 1st, at Sun-rise, he is only three degrees above the horizon, being then to the east of the four small stars in the tail of the Goat. The Moon passes him on the 12th.

Venus is an evening star, in a favourable position during the whole month. Her course is direct through twenty-seven degrees, being below the small stars in the band of the Fishes on the 1st; and ending near the small stars in the tail of the Ram. Her approach to and passage by Mars distinguishes this month; and the difference in the two planets, viewed through a telescope, will particularly strike our attention. They are both moving in the same direction, and the distance between them on the 1st is ten degrees, Mars being the highest. On the 3d Venus passes by the sixth of the Fishes, the star being two minutes and a half north of her; and this star, with the fifth below it, will thus be clearly ascertained. She thence traverses the barren regions between the eastern and western band, and passes between the sixteenth and fifteenth of the Fishes on the 10th. The two planets are now under the three first stars of the Ram, but Venus does not overtake Mars till the 21st, when she passes him at the distance of twenty-seven minutes north, the two planets being now between the first of the Ram and Menkar, but nearest to the former star. Venus now moves rapidly onwards, directing her course to the fourth of the Ram, which she passes on the 29th, the star being thirty-five minutes above her; and thus this star, and the sixth above it, will be known by the observer. The aspects of Mars, Venus, and Jupiter, above them, will frequently engage our attention. The Moon passes Venus on the 15th.

Mars is an evening star, having a direct motion through twenty-two degrees. He is first seen under the sixteenth and fifteenth of the Fishes, the small stars in the eastern band, between which he passes on the 2d, Venus being below, and the three stars of the Ram above him. The two planets are the nearest together on the 21st, but at the end Venus is considerably above him, being between him and the Pleiades. He is then under the fourth of the Ram, at the same distance nearly from the star as the star is from Venus. The Moon passes him on the 16th.

Jupiter is on the meridian at fifty-four minutes past six on the 1st, and fifty-two minutes past five on the 19th; and consequently this month is favourable to observations on him. On the 1st, when on the meridian, he is directly over the first of Orion, having to the east of him the seventh and twelfth of the Twins, towards which stars he is directing his course, but with a slow pace, as he moves through less than two degrees and a half in the whole month. He is near the eclip-tick the whole time, as he passes it in his ascending node, on the 19th. The approach of Venus and Mars to him, and the comparison of their splendours, will afford much gratification to the astronomer. At eight o'clock in the evening will be eclipses on the 7th and 30th of the first of his moons; on the 11th and 18th, of his second; and on the 28th, of his third moon. The Moon passes him on the 19th.

Saturn is a morning star, his duration above the horizon, before Sun-rise, continually increasing. His motion is direct through a degree and a half, being on the 1st on the eastern border of the Milky-way, between the twelfth and small stars in the head of the Archer, and advancing slowly afterwards towards them. The Moon passes him on the 8th.

Herschell is on the meridian on the 1st at thirty-seven minutes past four in the morning, being under the third, and having the tenth of the Balance near to him on the east. His motion is retrograde through only half a degree; and on the 21st he is on the meridian at twenty-two minutes past three in the morning. The Moon passes him on the 4th and the 31st.

The apparent diameter of the Sun, on the 3d, is thirty-two minutes eighteen seconds; and, on the 25th, thirty-two minutes six seconds. The apparent diameter of the Moon increases to the 13th, when it is thirty-two minutes thirty-two seconds: it then decreases to the 27th, being then twenty-nine minutes and a half; and it increases afterwards to the end of the month, finishing with a magnitude of twenty-nine minutes fifty-six seconds. On the 8th, at midnight, it is thirty-two minutes.

For the positions of the stars we consult the following table, according to the directions at the end of the preceding months.

TABLE OF POSITIONS.

Pos.	1		8		16			
	h.	m.	h.	m.	h.	m.		
I.	6	38	6	12	5	43		
II.	8	41	8	15	7	46	7	17
III.	10	30	10	4	9	35	9	6
IV.	0	51	0	25	11	56	11	27
V.	2	42	2	16	1	47	1	18
VI	4	38	4	12	3	43	3	14
VII.	6	38	6	12	5	43	5	14

APRIL, 1812.

THE nautical stars for this month are Aldebaran, the second of the Twins, the first of the Lion, the first of the Virgin*, Antares, the first of the Eagle†, the first of Pegasus‡, Fomalhaut. Of these, I shall take such as will present themselves to us conveniently in the evening; and during this month the first of the Lion will properly engage your attention. This star, it was observed at page 47, is near the meridian in the east, when the first of the Hydra is upon it; and this is the star on it in the third position described in the volume for 1806, page 191. Between eight and nine, therefore, in the beginning of the month, as specified in the table, and gradually later, you will direct your eyes to the south, and, from what has been before observed, will not fail to discover the first of the Lion, as there is no other star of that magnitude in that quarter. Al-

* Spica.

† α Aquilæ.

‡ α Pegasi, Regulus.

debaran and the second of the Twins you will look for in the western, and the first of the Virgin in the eastern hemisphere.

The latter star is, at the time above mentioned, near the horizon; but as the month advances, you will see it gradually higher at the same time of night, and we see it to the best advantage at the latter part of the month. Then the second of the Lion will be on the meridian between nine and ten, and upon this circumstance the fourth position described in the volume for 1806, page 200, is founded. At this time, we see the first of the Lion to the west, and the first of the Virgin to the east of the meridian, both being stars of the first magnitude; and in such different positions they cannot now be mistaken for each other. The star of the second magnitude near the first of the Lion, and the want of any such star near the first of the Virgin, sufficiently distinguish them in any other position, and you will now particularly note the five stars in triangle above the first of the Virgin, so that by this accompaniment you will know this star in any latitude. At this time the three nautical stars, the second of the Twins, the first of the Lion, and the first of the Virgin, may be so marked by you, that at no future time will they be forgotten.

This mode of pointing out the nautical stars may teach you to distinguish between artificial memory, and that which arises from actual observation. The former subject has occupied the attention of learned men in various ages, and in our own times some extraordinary displays have been made of it. Thus in a short time the names of the nautical stars and their order might be learned: but this remains a dead weight upon the mind, unless it can be applied to real use. I would not discourage any effort, by which useful knowledge might be either imparted or retained: but, when there is an easy, simple, and natural method, I should assuredly not have recourse to fictions. The sight of an object in nature is generally attended with so many circumstances, that, with very little attention on our part, they are, on the return of them to our view, brought back to our recollection; and, in pointing out the few things I have done, the nautical stars will, after a very little exercise, be stamped on your memory, and you will yourself notice others which will make the impression indelible.

After you have learned by observation the nautical stars I have mentioned, it will be useful to contemplate the progress of the Moon by them; and this forms a very pretty exercise on the artificial globe. By this or any former volume, you take the course of the Moon for any month, beginning with the new Moon, and noting, from the description of it, whether it is north or south of the ecliptick. This was not mentioned early in my books, but it will be the more amusing to trace out from the few marks in them, what was the course of the Moon at that time. By comparing the progress in one year with one five years after, you will see how the Moon's course deviates from any given path; and thence you will infer how distant it may be in ten years from an object, which suffered occultation in the year under consideration. You will perceive how it passes by the nautical stars, and why each was taken in preference to any other of the surrounding objects. You will see how each presents its different advantages in different latitudes; how admirably they are calculated to guide the wanderer on the seas; and how much we are indebted to the illustrious astronomer now dead, for having devised and given to the publick a work, whose merits will ever excite the greatest praise and admiration.

The course of the Moon has in every age commanded the attention of astronomers. By it particular æras have been formed, and from its eclipses, mentioned in history, the precise time of particular events has been calculated. An instance of this kind has lately been noticed, and made the subject of a memoir in the Royal Society. Herodotus, the father of history, tells us incidentally of an end being put to a war between the Medes and Lydians by a remarkable phænomenon. Just as the two armies were on the point of engaging, a sudden darkness came over them; the Sun gave no light, and the day was turned into the gloom of midnight. This was the effect of an eclipse of the Sun, and to produce it the eclipse must be total. Now total eclipses are very rare in any place, and the time of them may be calculated both backwards and forwards. The annual foretelling of them is known by every almanack, and the certainty of the prediction is acknowledged by multitudes being witnesses of the event at the time foretold.

But when an eclipse is to be calculated for a very distant period, such as this of Herodotus, that took place about six hundred years before Christ, we need not be surprised at a difference of opinion amongst the learned; and the discussion, if carried on with good temper, cannot but be productive of very good effects, an examination at least of the methods used to discover such events, and a detection probably of the errours, that have arisen in the calculation of one or other of the parties. On this remarkable eclipse a very great difference of opinion has arisen, and the names of very eminent men are affixed to very different dates. The subject will be brought into a narrow compass by the late memoir, which is under examination, from the very learned chronologist in Ireland, and we cannot doubt that much interesting matter will arise in the enquiry.

I was so much struck on reading the memoir, and the very pertinent remarks in it on the nature of eclipses, that I wrote to its author, to suggest to him a hint, which arose in my mind upon the occasion, and which has met with the concurrence of some of the best scholars in this country. In a memorable battle at the siege of Troy, a sudden darkness envelopes the combatants, and Ajax offers his celebrated prayer to Jupiter upon the occasion.

> " The men, the steeds, the armies, all are lost
> In gen'ral darkness! Lord of earth and air!
> Oh king! Oh father! hear my humble pray'r:
> Dispel this cloud, the light of heav'n restore;
> Give me to see, and Ajax asks no more:
> If Greece must perish, we thy will obey,
> But let us perish in the face of day.
> With tears the hero spoke; and at his pray'r
> The god relenting clear'd the clouded air.
> Forth burst the sun, with all enlight'ning ray;
> The blaze of armour flash'd against the day."

Now this circumstance may really have taken place, and been handed down by tradition to the poet, or it is merely a flight of imagination. If it really took place, we have a mean for ascertaining the precise time of the siege, and this much disputed subject will be settled to the satisfaction of the learned. To them and to men of science, I leave my conjecture; but the learned will not fail, before they decide upon it, to compare together the passages in Herodotus and Homer in the original languages, in which the real and supposed total eclipses are so clearly described.

Four of the planets are evening stars; Saturn is a morning star; Herschell rises before midnight. At an hour after Sun-set on the 19th, the four form an interesting sight, Mercury being then at his greatest elongation, and all being included in a space of little more than forty degrees in length, under midheaven in the west. The change of their relative situations each night will form many pleasing pictures; and the comparison of Venus with Jupiter on the one side, and Mars on the other, will paint them in such colours, that, when seen apart, they will not be mistaken.

On the 1st, the Moon rises nearly with the second of the Scorpion, and with that and the first will, during the morning of the 2d, make an object of notice. On the 3d, she rises in the morning soon after the first of the Scorpion, at a distance from her, and is perceived, when high in the heavens, to be directing her course above Saturn, to the east of her. On the 4th, she is followed soon after her rising by Saturn, who is between her and the small stars in the head of the Archer, but she does not pass him before day-break. On the 5th, she rises under the small star called *d* of the Archer, as she passed it at thirty-seven minutes before one. Saturn is to the west of her, and between them are the small stars in the head of the Archer. As her height increases, we shall perceive, that her course is directed to a point under the two first stars of the Goat. On the 6th, she rises below the two first stars of the Goat to the east of her, and by which she passes about day-break. On the 7th, she rises under the two first stars of the Goat, now to the west of her. On the 8th, under the eighth of the Water-bearer, directing her course to the eleventh,; and on the afternoon of this day she passes the ecliptick in her descending node, but, for obvious reasons, without an eclipse. On the 11th is new Moon, at twenty-seven minutes past three in the afternoon, but without an eclipse, as she is upwards of three degrees and a half in her upright south of the ecliptick.

On the 13th, the crescent of the Moon is seen again in the west under Mars, the Pleiades, Venus, and Aldebaran, forming with them a very beautiful groupe, Jupiter being at a considerable distance above them. On the 14th, she is seen to have passed both Mars and Venus, thus varying the groupe of the preceding evening; which change, from the motion of the planets in it, must excite continued attention. At nine she is seventy-seven degrees forty-nine minutes from the first of the Lion. On the 15th, she is considerably above the groupe of the preceding evenings, Jupiter being at some distance above her; and the planets, the Moon, Orion, and the Bull, form a brilliant scene in the west, about an hour and a half after Sun-set. At nine she is sixty-three degrees fifty-three minutes from the first of the Lion. On the 16th she is seen to have passed Jupiter, but at some distance, being now nearer to the third of the Twins than to the planet, and of course the two first of the Twins are above her at some distance. At nine she is fifty degrees twenty-six minutes from the first of the Lion. On the 17th, she is seen between the two first stars of the Twins and the two first of the Lesser Dog, Jupiter being now at a considerable distance from her to the west. At nine she is thirty-seven degrees twenty-five minutes from the first of the Twins.

On the 18th, the Moon is on the meridian at twenty-five minutes past six, having above her to the west the two first stars of the Twins, and below her to the east the small stars in the head of the Hydra, but being nearer to the latter than the former stars; and during the night her recess from the line between them will be apparent. At nine she is twenty-four degrees forty-eight minutes from the first of the Lion. On the 19th, she is on the meridian at a quarter past seven, being in the barren space between the Crab and the Lion, the small stars in its head being above her to the east, as are the small stars in the head of the Hydra below her to the west of the meridian. We perceive that she is directing her course under the first of the Lion. At nine she is sixty-six degrees fourteen minutes from the first of the Virgin. On the 20th she is on the meridian at eight, the fourteenth and fifteenth being at some distance from her to the west, as she passed the former of these stars about Sun-rise; the first of the Lion is near to her to the east, as she passes this star at twenty-eight minutes past nine, thus affording an excellent opportunity of pointing out this star to the young student of navigation. At nine she is fifty-four degrees thirteen minutes from the first of the Virgin.

On the 21st the Moon is on the meridian at forty-four minutes past eight, having above her the body of the Lion, the fourth and eighth, with the second, to the east; the first, seventh, third, and sixth, to the west of the meridian. On this day she passes the ecliptick in her ascending node, and at nine is forty-two degrees twenty-three minutes from the first of the Virgin, and forty-eight degrees thirty-four minutes from the second of the Twins. On the 22d, she is on the meridian at twenty-seven minutes past nine, having the eighth, third, and second of the Lion above her and near to the meridian, the two former to the west, the latter to the east of it. To the east of her are the five stars in triangle of the Virgin, the second near to her, which she passes before Sun-rise. At nine she is thirty degrees forty-two minutes from the first of the Virgin, and sixty degrees seven minutes from the second of the Twins. On the 23d, she is on the meridian at nine minutes past ten, the seventh of the Virgin being to the west, and the third farther from her to the east of it. The former of these stars she passed at twenty-nine minutes past eight, and at nine she is thirty-five degrees sixteen minutes from the first of the Lion. On the 24th, she is on the meridian at fifty-two minutes past ten, the first of the Virgin being below her and near to it on the east, the five stars in triangle above her to the west. At nine she is forty-seven degrees six minutes from the first of the Lion.

On the 25th, the Moon is on the meridian at thirty-five minutes past eleven, the tenth and eleventh of the Virgin being near to her on the east, and the first at a much greater distance on the west. At nine she is fifty-nine degrees from the first of the Lion. On the 26th is full Moon, at ten minutes past five in the afternoon, but without an eclipse, as she is four degrees and a half north of the ecliptick. She rises below the tenth and eleventh of the Virgin, and is soon followed by the first and second of the Balance, the line between which stars she passes before Sun-rise, being nearest to the first. At nine she is seventy-one degrees from the first of the Lion. On the 27th, she rises under the two first stars of the Balance, and above the third, which latter star she passes before, but does not reach the seventh till after, Sun-rise. At nine she is twenty-nine degrees fifty-four minutes from the first of the Virgin. On the 28th, she rises a little before the second of the Scorpion, and is seen above and receding from it during the night. On the 29th, she rises with the first of the Scorpion, and is seen at a considerable distance from that star, advancing towards Saturn. On the 30th, she is removed to a considerable distance from the two first stars of the Scorpion, Saturn being still to the east of her, but she will have passed him before her next appearance.

Mercury is an evening star, at his greatest elongation on the 19th, when he is about two hours above the horizon after Sun-set; consequently, we shall have many opportunities of seeing him in the middle of the month. He is on the 19th in the tail of the Ram, above the fourth, and under the Pleiades and Mars, Venus being at a considerable distance higher, and Jupiter still farther up. At an hour after Sun-set, he is above eight degrees above the horizon, in west-north-west: and now four planets attract our attention, of which the highest is in the lower part of the middle region. This singular sight will be enjoyed for several nights, before and after the 19th. Some observers will notice Mercury at the end of the first week, when he enters the second sign near the three first stars of the Ram, nor lose sight of him till the end of the month, when he is within three degrees and a half of the Pleiades; but most telescopes will be directed towards him and the other planets in the middle of the month. On the 29th he is stationary, and the Moon passes him on the 12th.

Venus is an evening star, in a favourable position, having a direct motion through twenty-four degrees. She commences her course from under the Pleiades, and about three degrees from the fourth of the Ram, being above this star, passes the Pleiades on the 7th, and the star called A of the Bull on the 9th, this small star being thirty-four minutes from her to the south. From this point she steers her course towards Jupiter, through the space between the two horns of the Bull, deviating more and more from the ecliptick to the north, and consequently passing Aldebaran and the Hyades at some distance. On the 27th, she is near the line between the two stars in the tips of the Bull's horns, and at last finishes her course, being between eight and nine degrees from Jupiter. Being thus between Mars and Jupiter, receding from the one, and approaching to the other, we cannot fail of making frequent comparisons between the three planets, and with Mercury, when he is visible. The Moon passes her on the 14th.

Mars is an evening star, but his duration above the horizon after Sun-set decreases every night. His motion is direct through twenty degrees, commencing under the fourth of the Ram, within two degrees of that star, and ending near the tenth of the Bull. He does not deviate so far from the ecliptick as Venus. He passes the Pleiades on the 17th, and the star called A of the Bull on the 22d, the star being thirty-seven minutes from him to the north, whereas it was south of Venus when she passed it. Thence he moves on to the second tenth of the Bull, which he passes on the 29th, the star being ten minutes south of him; and here we shall compare him well with Aldebaran. Mercury is at all times below, and Venus above him. The Moon passes him on the 13th.

Jupiter is an evening star, having a direct motion through four degrees and a half. On the 1st he is seen under the seventh and twelfth of the Twins, and his passage by these stars will attract attention. The seventh he passes on the 16th, the star being fifty-eight minutes south of him; and the twelfth on the 27th, this star being fifty-four minutes south of him. At first, Venus is thirty-eight degrees from him; but this distance daily diminishes, and we shall frequently compare together their different splendours. The three planets below him in the middle of the month are at considerable distances from him. At nine in the evening of the 6th, 22d, and 29th, his first moon is eclipsed; of the 19th and 26th, the second; of the 11th, the third; and of the 1st, the fourth. The Moon passes him on the 16th.

Saturn is a morning star, being on the meridian at fifty minutes past five on the morning of the 1st, and at three quarters past four on the morning of the 19th. His motion is direct to the 16th, when he is stationary, and of course he will be very near to the spot he is then in during the whole month. This is in the middle nearly of the space between the eastern bank of the Milky-way, and the small stars in the head of the Archer. The Moon passes him on the 4th.

Herschell is on the meridian at forty minutes past two in the morning of the 1st, and at twenty-five minutes past one of the 19th. His motion is retrograde through very little more than a degree. From the absence of the Moon, and his nearness to the meridian at midnight in the middle of the month, this is a favourable time for observations upon him. Our directions to him are, first, the first of the Balance and second of the Scorpion, which at midnight we discover near south-east by south. Near the middle of the line between these stars is our planet. To the west of the second of the Scorpion we see two small stars, the eleventh and tenth of the Balance, to the latter of which, farther west, is the planet, nearer than that star is to the tenth, and all three are nearly in a line. When on the meridian, also, he is under the small stars called the sixth of the Balance, to which we are directed by the third, a brighter star, under which they are. The Moon passes him on the 28th, very early in the morning, when she is near to the third of the Balance.

The sun's apparent diameter on the 2d is thirty-two minutes two seconds, and on the 20th thirty-one minutes fifty-two seconds. The apparent diameter of the Moon increases to the 11th, when it is thirty-three minutes twenty-eight seconds: thence it decreases to the 23d, when it is twenty-nine minutes and a half, increasing afterwards to the end of the month, and ending with a magnitude of thirty minutes forty seconds.

The positions of the stars will be discovered by the following table, and reference to the volume for 1806.

TABLE OF POSITIONS.

Pos.	1 h.	 m.	8 h.	 m.	16 h.	 m.	24 h.	 m.
II.	6	48	6	22	5	53		
III.	8	37	8	11	7	42	7	13
IV.	10	58	10	32	10	3	9	34
V.	0	40	0	23	11	54	11	25
VI.	2	45	2	19	1	50	1	21
VII.	4	45	4	19	3	50	3	21
VIII.			6	24	5	55	5	26

MAY, 1812.

THE nautical stars for this month are the second of the Twins, first of the Lion, of the Virgin, of the Scorpion *, of the Eagle †, of Pegasus ‡, of the Ram. Of the zodiacal stars you perceive, that Aldebaran only is missing, and the first of the Ram comes into play only at the end of the month. You will readily perceive the reason, when you consider, that on the 1st the Sun is near to the first of the Ram, having passed this star only a week before in our climate, and on the 1st, they set together at the same time. Before the end of the month it passes Aldebaran; and, consequently, during this month, this star is too near the Sun to be suited to the purposes of a lunar observation. At the close of the month, the first of the Ram precedes the Sun very considerably in its rising, and may therefore afford to

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* Antares. † α Aquilæ. ‡ α Pegasi.

the sailer an opportunity of discovering his longitude by an observation early in the morning.

About nine we shall have a good opportunity of noting some of these stars, as in the first part of the month we shall have the second of the Lion on the meridian at this time, and at half past nine on the 23d the first of the Virgin will be near the meridian. From the former of these stars the fourth position in the volume for 1806, page 209, is determined; and from the latter the fifth position, page 211. In the first case, namely, when the second of the Lion is on the meridian, we have, as was before observed, in page 62, two nautical stars to the west, and one to the east of the meridian. The second of the Twins and the first of the Lion to the west, and the first of the Virgin to the east of the meridian. Our nautical star, the second of the Twins, is distinguished by being the eastern of the two bright stars near midheaven in the west, and the first of the Lion, as being the nearest star of the first magnitude westward, and you will every night notice the third star above him, and the small stars in the head of the Lion, which completely distinguish him from any star of the first magnitude in any part of the heavens.

There are three stars of the first magnitude to the east of the meridian, the first of the Virgin, Arcturus, and the first of the Harp, which you will examine attentively, and hence discover sufficient marks of difference to prevent future mistakes. The chief feature is, that the first of the Virgin is in a desolate space compared with the others: the first of the Eagle and Arcturus are accompanied by small stars near them, which cannot fail to prevent their being taken for our nautical star. Our intended sailer will besides remark the stars in the Crow, between the meridian and the first of the Virgin, as also the two stars of the Balance to the east of it. Thus prepared, and noticing besides the five stars in triangle above it, he cannot fail of being able to employ his sextant properly, when this star and the Moon are together above his horizon.

At the close of the month, the first of the Virgin is near the meridian, as we have mentioned before, and as is described in the fifth position; and the nautical stars to the west of her are the second of the Twins and the first of the Lion, and to the east of her the first of the Scorpion and of the Eagle. The first of the Lion will be clearly known from the marks already given, but the

Twins may occasion some perplexity. This will be removed, if you recollect that the first of the Twins is nearest to Capella, and the second of the Twins nearest to the first of the Lion. The first of the Virgin we see in such a situation, that it cannot be mistaken: it is due south of us, on the upper border of the lower region; and you will now, if the state of the horizon permits it, remark the small stars with one of the second magnitude near to the horizon and to the east of the meridian. The small stars are in the head of Centaur, a beautiful constellation to those who see it in more southern latitudes; and thus the barrenness around the first of the Virgin and the five stars of the Triangle, the stars in the Crow, in the head of the Centaur, and the two first of the Balance, at a distance, form such a picture, that our nautical star cannot be mistaken.

The two nautical stars, the first of the Scorpion, and the first of the Eagle, are now near the horizon, the former near the south-east, the latter near east by north; and as they ascend the heavens, you may notice some of those marks, by which they are distinguished, and next month we shall have a better opportunity of viewing them. The two stars of the Balance being between the first of the Virgin and first of the Scorpion, form such a feature in the prospect of them, that, with the recollection of the order of the signs, we should, without any other circumstance, know how to distinguish these two nautical stars. For, knowing that the Virgin, the Balance, and the Scorpion, are three signs, placed in the order mentioned, we shall look for the first of the Scorpion to the east, and the first of the Virgin to the west of the Balance. It will be useful, however, to ask a learner, occasionally, which are the two nautical stars nearest to the two first stars of the Balance?

The evening walks this month will be enlivened by the progress of Venus by Jupiter. Mars is below these beautiful planets, and is getting too near the horizon to be seen to advantage; but as Venus is at her greatest elongation on the 24th, and with a northern latitude, she will call general attention to the west. Saturn and Herschell rise in the night, but Mercury is passing the Sun in his inferior conjunction.

On the 1st, the Moon rises near midnight under Saturn, and, during the morning of the 2d, will be perceived to be receding from him and the small stars in the head of the Archer. On the 3d, she rises in the morning at the same time nearly with the two first stars of the Goat, to the east of her, but she does not pass them before Sun-rise. On the 4th, she rises under and to the west of the two first stars of the Goat. On the 5th, she rises under the second of the Water-bearer, passing the ecliptick in the afternoon of this day, but, for obvious reasons, without an eclipse. On the 6th, she rises under the small stars in the Water-pot, passing the eleventh of the Water-bearer at five minutes past four. On the 7th, she is in the space between the lines drawn through the two eastern and two western of the four stars in Square and produced; and on the 10th is new Moon, at thirty-nine minutes past eleven at night, but without an eclipse, as she is upwards of four degrees and a half in her upright south of the ecliptick.

On the 12th, the crescent of the Moon is seen again in the evening, near to and under Mars, near the horizon in west-north-west, Jupiter and Venus being above her at a considerable distance. On the 13th, she has receded far from Mars, and is seen under the seventh and twelfth of the Twins, directing her course to the thirteenth; Jupiter and Venus are still above her; and these three objects form a beautiful groupe in west-north-west. On the 14th, she is seen to have receded considerably from the planets, and to be under the two first stars of the Twins, forming, however, a groupe with the planets, which will call our attention in the evening walk to the west-north-west. At nine she is forty-two degrees eleven minutes from the first of the Lion. On the 15th, she is perceived to have passed through the space between the two first stars of the Lion and of the Lesser Dog, and to be between the two former stars and the small stars in the head of the Hydra, directing her course to the first of the Lion, from which at nine she is distant twenty-nine degrees five minutes. On the 16th, she appears to be entering on the barren space between the Crab and the Lion, the first of the latter constellation being still at a considerable distance from her, and at nine she is seventy degrees ten minutes from the first of the Virgin.

On the 17th, the Moon is above the fourteenth and fifteenth of the Lion, and under the first, which latter star she will evidently pass near to before her reappearance, and at nine she is fifty-seven degrees fifty-two minutes from the first of the Virgin. On the 18th, she passes the eclip-tick in her ascending node, but, for obvious reasons, without an eclipse. The first of the Lion is now to the west of her, as she passed that star in the morning: above her, therefore, at some distance, we note the fourth, eighth, and third of the Lion, and at nine she is forty-five degrees fifty-one minutes from the first of the Virgin. On the 19th, she is on the meridian at twenty-seven minutes past seven, having above her the eighth and fourth to the west, and the second of the Lion to the east of the meridian. She is directing her course to the second of the Virgin, the most western of the five stars in triangle, and at nine is thirty-four degrees four minutes from the first of the Virgin. On the 20th, she is on the meridian at nine minutes past eight, the second of the Virgin being to the west, and the seventh to the east of her, the second of the Lion above her at some distance near to the meridian on the west. On the 21st, she is on the meridian at fifty-one minutes past eight, the third of the Virgin being above her, and the seventh to the west, the first being lower down, and at a considerable distance to the east. On the 22d, she is on the meridian at thirty-three minutes past nine, the first of the Virgin being below her, but near to the meridian on the west.

On the 23d, the Moon is on the meridian at seventeen minutes past ten, the tenth and eleventh being near to her on the west, and the two first stars of the Balance at some distance on the east. At nine she is sixty-seven degrees thirty-six minutes from the first of the Lion. On the 24th, she is on the meridian at two minutes past eleven, the second of the Balance being almost directly above her, and of course the first to the west, and the third to the east of the meridian. Saturn is now in the south-east, near the horizon. At nine she is twenty-six degrees thirty-six minutes from the first of the Virgin. On the 25th, she is on the meridian at forty-nine minutes past eleven, the second of the Scorpion being directly under her, and of course Antares below her to the east, and the two first stars of the Balance at some distance to the west. At nine she is thirty-eight degrees forty-two minutes from the first of the Virgin. On the 26th, is full Moon at thirty-four minutes past seven in the morning, but without an eclipse, as she is nearly five degrees in her upright north of the ecliptick. She rises a little before Antares, and her motion from this star towards Saturn will amuse the traveller in the night. On the 27th, she rises after Antares, now at a considerable distance from her, and she is perceived to be much nearer to Saturn, to the east of her, than to the star. On the 28th, she is followed soon after her rising by Saturn, and her progress by and from the planet will attract attention. On the 29th, she rises between the small stars in the head of the Archer, and the two first of the Goat, Saturn being now considerably to the west of her. On the 30th, she rises under the two first stars of the Goat, and on the 31st under the second of the Water-bearer, and passes the line between this star and the four small stars in the tail of the Goat, but nearest to the latter stars.

Mercury is in his inferior conjunction on the 10th, not visible, therefore, in the beginning of the month, from his nearness to the Sun, nor at the end of the month, when he is a morning star, from the unfavourableness of his position. His latitude is south, and on the last day nearly four degrees, so that then, being at his greatest distance from the Sun, he is at Sun-rise only four degrees above the horizon in east-north-east. Accurate observers will, however, notwithstanding these disadvantages, detect him. He is stationary on the 23d. The Moon passes him on the 11th.

Venus is an evening star, at her greatest elongation on the 24th; and, during the whole month, will attract most forcibly attention in our evening walks. Her motion is direct through thirty degrees. Her progress to, and passage by Jupiter, is a principal feature in this month. At first, we perceive her about an hour after Sunset above Mars and Aldebaran, at a considerable distance, as they are near the horizon in west-north-west: she herself is midway above the line between the two stars in the tips of his horns, directing her course to the fifth of the Twins, thus passing to the north of Jupiter, who is now seen near the twelfth of that constellation. Every succeeding night, till the 11th, we perceive her distance from Jupiter diminishing, when she passes him at the distance of nearly three degrees; and on the 12th we see her near to the fifth of the Twins, as she passes this star at the distance of fifty-four minutes, being to the north of it. Her distance from Jupiter now rapidly increases; and in her progress through the space between him and the two first of the

Twins, we shall frequently admire the groupe formed by the two planets, and the three first stars of this constellation, the third being below Jupiter. She finishes her course in a line nearly with the two first stars of the Twins. At her greatest elongation, she is upwards of three hours and a half above the horizon after Sun-set. The Moon passes her on the 14th.

Mars is an evening star, his duration above the horizon after Sun-set daily decreasing, being at first only about two hours and a half. His motion is direct through twenty-degrees and three quarters, being at first above the Pleiades and Aldebaran, nearly midway in the west-north-west, and he is directing his course through the space between the two horns of the Bull, keeping the whole time near to the ecliptick. On the 27th, he passes the small star called the hundred and thirty-second of the Bull, the star being fifteen minutes and a half from him to the north. He will then, however, be so near to the horizon, that the star will not be noticed. We shall perceive how greatly the distance between him and Venus daily increases. The Moon passes him on the 12th.

Jupiter is an evening star, and will, with Venus, excite our attention very soon after Sun-set, to the top of the lower region in the west. His motion is direct through six degrees, and we perceive him first above the twelfth and seventh of the Twins, but nearest to the former star. He passes the line between the twelfth and the fifth on the 6th, and that between the fifth and the third on the 27th, being near to the fifth. The rapidity of the motion of Venus, compared with his, and her superior brightness, will be very perceptible. At nine o'clock at night of the 15th and 22d, we may observe eclipses of his first moon; on the 21st and 28th, of his second moon; and on the 17th, of his third moon. Our Moon passes him on the 14th.

Saturn is on the meridian at four in the morning of the 1st, and at three quarters past two of the 20th. His motion is retrograde through a degree and twenty minutes, being to the east of the eastern border of the Milky-way, and having the small stars in the head of the Archer to the east of him. The Moon passes him on the 1st and 28th.

Herschell is on the meridian at a quarter before one in the morning of the 1st, and at twenty-one minutes past eleven at night of the 21st. His motion is retrograde, through a degree and a quarter, receding westward from the point at which he is on the 1st, when on the meridian under the sixth of the Balance. The Moon passes him on the 25th.

The apparent diameter of the Sun on the 2d is thirty-one minutes forty-six seconds, and on the 19th thirty-one minutes thirty-nine seconds. The Moon's apparent diameter at midnight of the 1st is thirty-one minutes; and it increases to the 9th, when it is thirty-three minutes ten seconds: it then decreases to the 21st, when it is twenty-nine minutes thirty-four seconds; and increases afterwards to the end of the month, being then thirty-one minutes fifty seconds.

For the positions of the stars on any day this month, consult the following table.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
IV.	9	7	8	40				
V.	10	58	10	31	10	0	9	28
VI.	0	54	0	27	11	56	11	24
VII.	2	54	2	27	1	56	1	24
VIII.	4	59	4	32	4	1	3	29
IX.					6	4	5	32

JUNE, 1812.

THE nautical stars this month are Antares, the first of the Eagle, of Pegasus, Fomalhaut, the first of the Ram, Aldebaran, the first of the Lion, and of the Virgin. You will perceive that the second of the Twins has disappeared from the catalogue of the preceding month, and that Aldebaran has made his appearance. You will not be at a loss for the reason, when you consider the season of the year, and that the Sun is now travelling from Aldebaran to a point under the second of the Twins; and, consequently, in the first part of the month, the former star will be invisible, and at the end a morning star.

In this month, the intended sailer will, in addition to his former stock, make himself acquainted with Antares and the first of the Eagle; and this he will do by a few observations between nine and ten in the evening. At the end of the month, the northern crown and the oblong of the

Lesser Bear, by which the sixth position is fixed *, are on the meridian at nine o'clock, and consequently later at the beginning: but then the two first stars of the Balance will be on the meridian at nine early in the month, and then we shall perceive the first of the Virgin to the west, and Antares to the east of the meridian, but in the lower region in south-south-east. You notice, first, that it is a star of the first magnitude; next, that a star of the second magnitude, near it, has under it two stars of the third magnitude. These three stars are such an accompaniment to Antares, that this nautical star cannot ever be mistaken, nor can any other star of the first magnitude be taken for it. I have already noticed that its being to the east, and Spica to the west of the Balance, would alone, when the two stars were visible, distinguish one from the other.

Having examined attentively Antares, with the stars near to him, you will turn to the east, and, in the lower region, discover another nautical star, the first of the Eagle, by its being the only star of the first magnitude in that quarter. This star is easily distinguished from all other stars of

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* Volume for 1806, page 220.

the same magnitude by very appropriate marks. For, first, he is accompanied by two stars, one above, and the other below, but both near to him, which will catch your attention: and next to the east of him are the four small stars of the constellation called the Dolphin. A few nights' observation will make these objects very familiar to you; and, on carrying your eyes from one nautical star to the other, the difference of their appearances will be more striking. Thus the first of the Lion is now in the west; but how different are his accompaniments from those of the first of the Eagle in the east! and the two intermediate nautical stars, the first of the Virgin in the west, and Antares in the east, are perfectly distinguished in appearance from them both.

The first of the Eagle is at some distance from the zodiack; and the reason of this star being chosen for a nautical star will be obvious to you, when you consider how barren the zodiack is of bright stars to the east of Antares. The system of nautical stars was formed for the convenience of nautical observation, and of course stars of the first magnitude were preferred, and none less than those of the second magnitude are admitted into the catalogue. You may amuse yourself with a globe, by judging for yourself the propriety of the selection; and, whatever improvement may be hereafter made, you will see that in every position of the Moon, there are always objects at a suitable distance from her, which will answer the purpose of the sailer.

In the day-time, it will be useful to fix the globe for the position of the stars between nine and ten, and thence noting the nautical stars, that will be above the horizon at that time; and this puts me in mind of a very proper remark made to me on my work by a gentleman to whose suggestions I always listen with the greatest pleasure. In recommending the artificial globe of the heavens to be so placed, that a line from its centre through each star described on it should pass through the real star in the heavens, I neglected to notice a circumstance, which, if not taken into consideration, will carry the lines so drawn to very different objects. The first point is, to place the globe so, that a line, drawn through the points marked north and south on the artificial horizon, should pass through the real points of north and south in the heavens. This may be easily done, if we have drawn a meridional line on our floor, or have the north polar star in sight; but in the defect of these appearances, or something similar to them, recourse, I have observed, is to be had to the compass, which generally accompanies the globe: but, unfortunately, it is in the poet's imagination only, that it can be said,

> True as the needle to the pole.

The needle is not true to the pole, and an inattention to this circumstance has been productive of mistakes on earth, as it might be of similar ones in the heavens, if we were guided solely by this valuable instrument. I think I have read somewhere, that large estates were surveyed in Jamaica, and the boundaries, properly ascertained at the time the survey was made, did not agree with the later surveys. This may be easily conceived, when you consider, that the points which were laid down on paper for north, south, east, and west, were very different at one time, from what they were at the other, if these points were taken from the compass; and if a survey is taken by means of a meridional line drawn through the estate, this will differ very much from one taken at different intervals by the compass. In fact, the compass is a very useful instrument in measuring, but the previous thing is to ascertain its variation; and every large landed proprieter should question his surveyer on the steps he has taken, to ascertain accurately the points of north and south, by which his estate was mapped.

Venus and Jupiter adorn the west during the former part of this month, but Venus is travelling very rapidly from the latter planet, and the Sun is making advances towards him, so that by the close of the month he will be lost in his rays after Sun-set. This is the case with Mars at the beginning of the month. Mercury is a morning star. Saturn and Herschell are seen during the greater part of the night.

The Moon rises in the morning of the 1st soon after midnight, under the second of the Water-bearer, and passes the ecliptick about eleven at night in her descending node, but, for obvious reasons, without an eclipse. On the 2d, she rises under the four small stars in triangle of the Water-bearer. On the 3d, she is seen to have passed the line drawn through the two western of the four stars in Square and produced. On the 4th, she rises under the four stars in Square, being nearly in a line with the two eastern of them. On the 5th, she rises under the four stars in Square, but nearly in a line with the second and third of Pegasus, the highest and lowest of the four stars. On the 6th, she rises under the three first stars of the Ram; and before Sun-rise, Mercury, being in his greatest elongation, will, notwithstanding his nearness to the horizon, be seen by some astronomers to the east of her. On the 9th, is new Moon at fifty minutes past seven in the morning, but without an eclipse, as she is nearly four degrees and three quarters in her upright south of the ecliptick.

On the 11th, the crescent of the Moon will be seen under the two first stars of the Twins, and forming, with Jupiter below and Venus above her, an object to attract our attention after the setting Sun in our evening walks. On the 12th, she is in the barren region of the Crab, which is now splendid with Venus, which the Moon passes this evening, directing her course to the first of the Lion. On the 13th, she is seen to have travelled considerably from Venus; and about an hour after Sun-set, Jupiter, near the horizon, near north-west by west, the two stars of the Twins, Venus, the Moon, and the first of the Lion, to which latter star she is the nearest, will form a very pleasing groupe. On the 14th, she is perceived to have passed the first of the Lion, this star being near to her on the west, and on this day she passes the ecliptick in her ascending node, but, for obvious reasons, without an eclipse. On the 15th, she is seen at a considerable distance from the first of the Lion, and we distinguish above her the eighth, fourth, and second of the Lion: she is directing her course through the five stars in triangle of the Virgin. On the 16th, the second of the Virgin is seen very near to and under her, and her progress from this star towards the seventh of the Virgin will be marked. On the 17th, she is seen near to the third of the Virgin, as she passes this star at thirty-eight minutes past nine in the evening; and now the nautical star, the first of the Virgin, will claim attention, as, leaving the five stars in triangle, she directs her course above it at a considerable distance. On the 18th, she is seen above the first of the Virgin, directing her course through the two first stars of the Balance.

On the 19th, the Moon is on the meridian at eight minutes past eight, the tenth and eleventh of the Virgin near to and below her, to the east of the meridian. The first of the Virgin is now at some distance to the west of her. On the 20th, she is on the meridian at fifty-two minutes past eight, having the first of the Balance below her to the west, and the second above her to the east of the meridian, but she is considerably the nearest to the first of these stars. On the 21st, she is on the meridian at thirty-eight minutes past nine, being between the third and the twenty-third of the Balance, the former to the west, the latter to the east of her. The nautical star, Antares, now below her to the east of the meridian, will be noticed, as will Spica, beyond the two first of the Balance, considerably to the west. On the 22d, she is on the meridian at twenty-six minutes past ten, the nautical star, Antares, being now below her, but a little to the west of the meridian; and its companions, the second, fourth, and sixteenth of the Scorpion, considerably more to the west. Saturn, to the east of the Moon, will now catch our attention. On the 23d, she is on the meridian at seventeen minutes past eleven, having below her Antares to the west, and Saturn to the east of the meridian. On the 24th is full Moon, at thirty-three minutes past seven in the evening, but without an eclipse, as she is upwards of four degrees in her upright north of the ecliptick. She is followed soon after her rising by Saturn, whom she passes this night; and at midnight the planet is almost directly under her, near the meridian, and her progress by him will amuse the traveller.

On the 25th, the Moon is perceived, at her rising, to have travelled considerably from Saturn, the stars in the head of the Archer being now between her and the planet; and, at midnight, she is midway between him and the two first stars of the Goat. On the 26th, she rises soon after the two first stars of the Goat, which she passes before midnight; and, in her passage under them, we shall notice above them, at some distance, the nautical star, the first of the Eagle. On the 27th, she rises between the two stars of the Goat, and the second of the Water-bearer, but nearer to the latter star, and near to the ecliptick. Directly above her, at some distance, is the nautical star, the first of the Eagle; and, being the only star of the first magnitude in that region, it cannot be mistaken. On the 28th, she rises soon after the eighth of the Water-bearer, to the east of her, and she passes this star after midnight; during the night, therefore, the four stars in triangle of the Water-bearer will be observed, and beyond them, the nautical star, the first of Pegasus. Soon after midnight she passes the eclipitck in her descending node, but, for evident reasons, without an eclipse. On the 29th, she rises under the four stars in triangle of the Water-bearer, having just passed the line with the two western of the four stars in Square, of which the nearest to her is the nautical star, the first of Pegasus. On the 30th, she rises under the four stars in Square, being nearest to the lowest of them, the third of Pegasus.

Mercury is a morning star during the whole of this month, being at his greatest elongation on the 6th; but, from its unfavourable situation and great southern latitude, it is not then at Sun-rise four degrees above the horizon. This latitude, however, decreases, and the situation becomes more favourable; but, during the whole month, it will be so near the horizon, that, at this season of the year, the Sun's rays will have too great power over him to permit him to be noticed by the common observer. The Moon passes him on the 7th.

Venus is an evening star, exciting our attention soon after Sun-set, near the west; and, when the stars appear, she will be seen to the east of the line drawn through the two first stars of the Twins, the nautical star being nearer to the first than to the planet. Jupiter is now at a considerable distance from her to the west. Her motion is direct through twenty degrees, and she ends her course in the barren space between the Crab and the Lion, under the small stars in the head of the latter constellation. In the first part of the month, the groupe formed by her, the two first of the Twins, and Jupiter, will be a pleasing feature near the western horizon; but as she recedes from the Twins, the power of the Sun's rays is more sensibly felt by Jupiter and the two stars. On the 12th and 13th, we remark her passage by the nebula in the Crab, passing between the two stars, the third and fourth of this constellation. The Moon passes her on the 12th.

Mars is an evening star, about ten degrees from the horizon at first, at Sun-set, and this height is daily diminishing; and as his conjunction is next month, he is in a disadvantageous sign: he will, before the end of this month, be completely overpowered by the Sun's rays, before he sets. His course is direct through twenty degrees, passing above the seventh and twelfth of the Twins in the second week; under the fifth, on the 16th; and above the fourth, on the 27th. The Moon passes him on the 9th.

Jupiter is an evening star, but, being above Mars for the greater part of the month, he will attract our attention at first, and at last disappear with Mars, who passes him on the 27th. The motion of Jupiter is direct through six degrees and a half, from a point to the east of the fifth of the Twins, to one just above the fourth. The Moon passes him on the 11th.

Saturn is on the meridian about fifty minutes past one on the morning of the 1st, and at midnight on the 26th. He will, therefore, about the close of the month, rise at Sun-set. His motion is retrograde, through about two degrees, being between the twelfth and the small stars in the head of the Archer, and directed towards the former star. We shall notice his motion by observing the diminution of distance of the planet from the eleventh and twelfth of the Archer, and increase of it from the small stars in the head. He finishes his course considerably within the Milky-way, and within three degrees from the eleventh of the Archer, which, when he is on the meridian, will be nearly below him; and during the whole month will be noticed as being the nearest to, but to the west of him, when on the meridian. The Moon passes him on the 24th.

Herschell is on the meridian at thirty-four minutes past ten on the 1st, and at nine minutes past nine of the 21st at night, being to the west of the sixth of the Balance, and almost directly under the second; and by the end of the month he will be directly under this star. His motion is retrograde through not quite a degree; and the Moon passes him on the 21st.

The Sun's apparent diameter on the 1st is thirty-one minutes thirty-five seconds, and on the 19th thirty-one minutes thirty-one seconds. The Moon's apparent diameter increases to the 6th, when it is thirty-two minutes forty-four seconds: it then decreases to the 18th, to twenty-nine minutes thirty-eight seconds; after which it increases to the end of the month, closing with a magnitude of thirty-two minutes twenty-two seconds.

For the position of the stars at any hour of the night, consult the following table and the volume for 1806.

TABLE OF POSITIONS.

Pos.	1		8		15		23	
	h.	m.	h.	m.	h.	m.	h.	m.
V.	8	55	8	26	7	57		
VI.	10	51	10	22	9	53	9	20
VII.	0	51	0	22	11	53	11	20
VIII.	2	56	2	27	1	58	1	25
IX.	4	59	4	30	4	1	3	28
X.			6	25	5	56	5	23

JULY, 1812.

THE nautical stars this month are Antares, the first of the Eagle, Fomalhaut, the first of Pegasus, of the Ram, Aldebaran, Regulus, and Spica *. This is a favourable month for making our remarks on Antares, as before the middle of the month it is on the meridian at nine o'clock; and of course will, throughout the whole of the month, present himself to us in a favourable position at that time. You will, therefore, familiarise yourself this month with this star, by the remarks made on it in the preceding month; and as you may perceive, by the table at the end of this month, that the favourable time for observing the seventh position is on the 25th, at ten minutes past nine, you will take the other times for that position, to view the nautical stars in it, as suit your conveniency.

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* The first of the Virgin.

At these times we have only four nautical stars above the horizon, Antares and Spica to the west, the first of the Eagle and of Pegasus to the east of the meridian. The two former stars you are now well acquainted with, and the two latter will give little trouble; for one being of the first, and the other of the second magnitude, they cannot be mistaken for each other. You will, however, this month, mark particularly the first of the Eagle, seen at the times specified in midheaven near south-east: you will mark the star above, and the star farther from it below, the former being the third, and the latter the second of this constellation; and, fixing these marks in your memory, you will not fail of recognising the first of the Eagle. The four small stars in the Dolphin, to the east of him, must strike your attention; and this picture, being presented very frequently to you, will make a lasting impression.

The other nautical star, the first of Pegasus, is in the east, in the lower region. This, being a star of the second magnitude, is more liable to be mistaken; but we have sufficiently distinguishing marks. It belongs to a remarkable figure in the heavens, which I have denominated the four stars in Square, from the stars being placed in the corners of a figure, though not exactly, yet very nearly, resembling a square. Our star is one of the two western of these stars; consequently, if the four are visible, you know in which pair it is to be found. The next circumstance completely distinguishes our star, namely, that it is the farthest of the two from the north pole. Thus when you see the four stars in Square, of which now the lowest is too near the horizon, you will consider them as divided into pairs, the two eastern and the two western; of the western pair you select that at the greatest distance from the north pole as the first of Pegasus, the other is the second of Pegasus.

You will be confirmed in your opinion by the appearances around the stars. At no great distance from each, is a star of the third magnitude; but the interval between our star and its companion is the greatest. Besides the star of the third magnitude, near to the second of Pegasus, there are two other stars, at nearly the same distance from it, both of the fourth magnitude, and near to each other; and our nautical star has no such accompaniment. But we have another very decisive mark, which seldom fails us, and that is, the four small stars in triangle, below and to the south of it; and as there is no such appearance near either of the other four stars in Square, we cannot take any but the right one for our nautical star. You will, then, familiarise yourself this month to the difference between the two western of the four stars in Square, by the two small stars near to the second of Pegasus, and by the four stars in triangle, nearest to, but at some distance from the first of Pegasus. The next month will place the four stars in Square in a more advantageous position, and complete our knowledge. Fomalhaut, a nautical star of the first magnitude, would in some climates come under observation, but he is now, at this hour of the evening, under the horizon.

From the remarks in last month, I presume that some of my readers have noticed the difference between the point of north, according to the compass, and the real point of north in the heavens. The latter is found by means of the height of the Sun at noon, and the shadow cast at that time. If the polar star is visible at night, it will not be difficult to direct the axis of the globe towards it; but, in fact, with a very little attention, the globe may be placed with sufficient accuracy. The table at the end of each month shows the time, when some principal star is on the meridian on certain days; and if we take the position for the time nearest to that, when we are placing our globe, we can place that star on the meridian; and, moving the globe then at the rate of one degree for every four minutes, between the time that this star is on the meridian, and the time of the night when we are looking on the globe, we shall have the true position of the stars for that moment. Our compass also gives us such a direction, that we may turn the axis of the globe towards the north; and now, by looking towards the heavens, we shall easily find some stars, by which our globe is to be more accurately placed. This is a thing, however, that practice and observation will teach us better than many words: but the true way is, to note the variation of the needle in the day time, which, showing you the number of degrees the magnetical pole is from the pole in the heavens, you will at night make the same deviation from the magnetical north point, and the real north point.

In this month, two of the planets, that in the last enlivened our evening walks, cease to appear. Both Mars and Jupiter are in conjunction with the Sun; and Venus is seen at the same time each evening lower than it was the preceding evening. Mercury passes her when she is near the horizon at Sun-set. Saturn is in the eastern hemisphere at this time, but Herschel near the meridian.

The Moon rises on the 1st about midnight, under the four stars in Square, and in a line nearly with the highest and lowest of these stars; and, during the morning of the 2d, we perceive to the east of her the three first stars of the Ram. On the 3d, she rises in the morning under these stars. On the 4th, she is seen to have passed the line between the first of the Ram and Menkar. On the 5th, she rises under the Pleiades, and is seen to direct her course towards Aldebaran. On the 6th, she is seen to have passed Aldebaran, as it is now near to her on the west; and on the 8th is new Moon, at thirteen minutes past five in the afternoon, but without an eclipse, as she is about three degrees and a half south of the ecliptick.

On the 10th, we perceive the Moon again in the west in the evening, under Venus, and directing her course by this planet to the first of the Lion. On the 11th, she is first seen between Venus and the first of the Lion, as she passed the planet early in the morning, and she passes the star at twenty-two minutes past nine. At nine she is fifty-four degrees twelve minutes from the first of the Virgin. On the 12th, Venus and the first of the Lion are seen to the west of her, above whom we notice the fourth and second of this constellation; which, with the eighth, form a triangle easily remembered. On this day she passes the ecliptick early in the morning, in her ascending node; but, for obvious reasons, without an eclipse. At nine she is forty-one degrees fifty-eight minutes from the first of the Virgin. On the 13th, she is perceived to be to the west of the five stars in triangle of the Virgin, and nearest to the second of this constellation, which, however, she does not pass before she sets. Above her we notice the second of the Lion, and, at a considerable distance from her to the west, the first, and Venus. The first of the Virgin, to the east of her, is at nine thirty degrees three minutes from her. On the 14th, she is between the seventh and third of the Virgin, but nearest to the former star, and she does not pass the latter star for some time after setting. At nine she is sixty-four degrees ten minutes from Antares.

On the 15th, the Moon is to the east of the five stars in triangle of the Virgin, as she passed the third of this constellation at half past five in the morning. The first is below her to the east, and she is directing her course through the two first stars of the Balance to the third of that constellation. At nine she is fifty-two degrees thirty-three minutes from Antares. On the 16th, she is perceived to have passed the first of the Virgin, which is at some distance below her to the west. At nine she is forty-one degrees one minute from Antares. On the 17th, she is perceived to have passed the tenth and eleventh of the Virgin, having now these stars to the west, and the first of the Balance to the east of her. On the 18th, the two first stars of the Balance are seen at some distance from her to the west; and at fifty-two minutes and a half past eleven she passes the third of the Balance, the star being only sixteen minutes north of her. On the 19th, she is on the meridian at thirteen minutes past eight, having below her, a little to the west, the second of the Scorpion, and much lower, and at a greater distance from the meridian to the east, the first of this constellation, or Antares, which, being a nautical star, will, in this position, be easily noticed. To the east of her, at a considerable distance, is Saturn.

On the 20th, the Moon is on the meridian at two minutes past nine, having above her the seventh of the Serpent-bearer, and below her to the west Antares, and to the east Saturn at a greater distance. At nine she is forty-seven degrees nineteen minutes from the first of the Eagle. On the 21st, she is on the meridian at fifty-four minutes past nine, Saturn being now under her, but to the east of the meridian; and her progress by this planet, which, however, she does not pass before Sun-rise, will amuse the traveller. On the 22d, she is on the meridian at forty-nine minutes past ten, having under her the small stars in the head of the Archer, Saturn to the west, and the two first stars of the Goat at a much greater distance to the east of her. On the 23d, she is on the meridian at forty-four minutes past eleven, having above her to the east the two first stars of the Goat, Saturn being now at a considerable distance from her to the west. She does not pass the two first stars of the Goat before Sun-rise. On the 24th, is full Moon at three quarters past five in the morning, but without an eclipse, as she is two degrees and a quarter north of the ecliptick. In the evening she rises under the two first stars of the Goat, and is seen during the night to recede rapidly from them. On the 25th, she rises under the second of the Water-bearer, and is followed soon by the four small stars in the tail of the Goat, but she has passed the line between them and the former star. On the 26th, she passes the ecliptick in her descending node in the morning, but, for obvious reasons, without an eclipse, and in the evening she rises under the small stars in triangle of the Water-pot, passing under the tenth of the Water-bearer, the small star on the western edge of the stream from the Water-pot, at one minute past ten.

On the 27th, the Moon rises in the space between the two lines produced, that are drawn through the two western and two eastern of the four stars in Square, but she does not reach the latter of these lines during her stay above the horizon. On the 28th, she rises under the four stars in Square, being perceived to have passed the line drawn through the two eastern of these stars and produced. On the 29th, she is followed soon after her rising by the thirteenth of the Fishes, as she passes this star at thirty-one minutes past eleven: above her, therefore, to the east, we shall notice the three first stars of the Ram, and to the west the four stars in Square. On the 30th, she rises under the three first stars of the Ram, and in the following morning passes over the twelfth of the Whale, the occultation beginning at twenty-eight minutes and a half past two, the star being ten minutes north of the centre, and ending at twenty-three minutes and three quarters past three, the star being then eight minutes north of the centre. In the evening, of course she rises under the line drawn between the first of the Ram and the Pleiades, but nearest to the latter stars. She has passed the line between them and Menkar, or the first of the Whale, to which she is the nearest, and she is evidently bending her course towards Aldebaran and the Hyades.

Mercury is in his superior conjunction on the 7th, and consequently will not be visible in the former part of the month. After the 7th, he is an evening star. On the last day of the month, he is not eight degrees above the horizon at

Sun-set, being then to the west of the first of the Lion, so that he will not be seen this month by any but very keen astronomers. The Moon passes him on the 8th.

Venus is an evening star, being stationary on the eleventh, and after that having a retrograde motion, and consequently her duration above the horizon after Sun-set daily decreasing. Her motion is confined to the barren space between the Lion and the Crab, slow, of course, in both directions, first towards the first of the Lion, and then back towards the Crab, reaching the borders of this latter constellation at the end of the month. The nebula being to the west of her. The Moon passes her on the 11th.

Mars is in conjunction on the 27th, and too near the Sun at any time to be visible.

Jupiter is in conjunction on the 10th; and, in the latter part of the month, disengaging himself from the Sun's rays, becomes the harbinger of day in the east, being then seen under the two first stars of the Twins. The Moon passes him on the 8th.

Saturn is on the meridian on the 1st, at thirty-six minutes past eleven at night, and at seventeen minutes past ten on the 19th. His motion is retrograde through two degrees, arriving at the end of the month at a point between the twelfth and eleventh of the Archer. We shall know the latter of these stars by its being at first nearest to him, and the passage between these stars will afterwards sufficiently distinguish them. The Moon passes him on the 22d.

Herschell is on the meridian on the 1st, at twenty-seven minutes past eight, and on the 22d at seven. On the 27th he is stationary, being then, when on the meridian, directly under the second of the Balance; and, of course, from the slowness of its motion, not far from this spot during the whole of the month. The small stars, the thirteenths, are above him to the west, and the sixths to the east of the meridian. The Moon passes him on the 18th.

The Sun's apparent diameter, on the 1st, is thirty-one minutes thirty-one seconds; and on the 19th, thirty-one minutes thirty-two seconds. The Moon's apparent diameter increases to the

2d, when it is at noon thirty-two minutes twenty-six seconds. It decreases afterwards to the 16th, when it is twenty-nine minutes thirty-eight seconds: thence increasing to the 27th, when it is thirty-two minutes thirty-eight seconds, and then decreasing to the end of the month, finishing with a magnitude of thirty-two minutes eight seconds.

For the positions of the fixed stars, the following table may be consulted, which directs to the descriptions of them in the volume for 1806.

TABLE OF POSITIONS.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VI.	8	47	8	18	7	46	7	10
VII.	10	47	10	18	9	46	9	10
VIII.	0	52	0	23	11	51	11	15
IX.	2	55	2	26	1	54	1	18
X.	4	50	4	21	3	49	3	13
XI.			6	22	5	50	5	14

AUGUST, 1812.

THE nautical stars this month are the first of the Eagle, of Pegasus, Fomalhaut, the first of the Ram, Aldebaran, the second of the Twins, Spica, and Antares. Of these but few present themselves to us in the evening. One of them, the first of the Eagle, is the star on whose nearness to the meridian the eighth position is founded; and consequently the time for observing it is seen by the table. It is in this situation, at nine, at the end of the month, and of course later in the former part. The seventh position, in the former part of the month, shows Antares and the first of the Eagle to advantage; and we shall see them then about half past eight, Antares in the lower region to the west of the meridian, and the first of the Eagle in the middle region considerably to the east of it. By the marks given in the preceding month, we shall now easily distinguish them, as well as Spica, near the horizon in west-south-west, and the first of Pegasus near the horizon in the east.

When the first of the Eagle is on the meridian, you will remark how deficient our hemisphere is in nautical stars. There is only Antares in the western part, and he is in the horizon. In the eastern part, we have the first of Pegasus and the first of the Ram. The four stars in Square now present themselves to advantage in east by south, the highest of them being in mid-heaven. You will, therefore, exercise yourself in marking the differences between these stars; and, to the circumstances already pointed out, your own observation will discover others, by which you may be confirmed in your judgement in other regions. The first of the Ram again claims our attention, in the lower region, to the east of east-north-east. You will recollect his being accompanied by two stars, one of the third and the other of the fourth magnitude, and when you look above it, and see the three stars of the second magnitude nearly in a line, and at equal distances from each other, this nautical star will be completely impressed upon your memory.

This month will bring to your recollection the comet of last year, which made its appearance at this time. It was first seen, I believe, by a lady at Ramsgate, who noticed it in the morning; but her report was not confirmed for some time by similar observations. On the last day of the month, another lady was walking on the pier in the evening, when she discovered the stranger, and her account, which she sent to me the next day, I will here transcribe.

"By the light of a lovely Moon, we were walking upon the pier, when we observed an appearance over Albion Place, which strongly reminded me of the comet of 1807. I pointed it out, though at first we thought it only a star, obscured by a slight haze: but, before we reached the end of the pier, I was convinced, that it must be a comet, and proceeded, according to my imperfect knowledge of astronomy, to observe its situation. A few evenings before you left us, you had noticed to me the extent of the constellation of the Great Bear, and two pair of small stars I then understood you to be in the paws, situated at some distance from each other, in the direction, which I shall describe, on the other side of the paper, as well as I can, from memory; and the appearance, which I presumed to be a comet, I have placed, as it seemed to be, under them. I hope you will be able to find it out by this imperfect description. The time when we saw it first was past eight o'clock, and about half past nine it had disappeared, being very little above the horizon."

From the sketch thus sent to me, I had a complete knowledge of the situation of the comet, which was confirmed to me by a letter, the same post, from Mr. Capell Lofft, who had viewed it, the same evening, with instruments, and whose zeal for the diffusion of astronomical knowledge entitles him to the greatest praise. His observations he communicated to the publick through the papers, and I wish that his example had been more generally followed.

I have given this little history, that you may, in similar circumstances, follow the example of my correspondent. If any singular appearance strikes you in the heavens, note the objects around it. Make a little sketch of it; and, if it is a comet, mark its situation and appearance as well as you can, and note the time of the observation. If there is a person in the neighbourhood of eminent talent in astronomy, send the sketch to him; and it may be of great use in leading him to the discovery of it on a succeeding evening. Particular remarks on the right ascension and declination of the object will be made afterwards, but a slight sketch is quite sufficient for an astronomer.

There is, indeed, a degree of bashfulness, that prevails at times, and may prevent persons from communicating remarks of this kind. They may deem it an intrusion on the time of a man of science; they may think it not worth his notice; or they may be afraid of exposing themselves to ill-placed jests, if their well-meant endeavours should meet with an ungrateful return. But the latter circumstance is, I trust, exceedingly rare; and, when any of us considers how little he knows, how gradually he acquired the little knowledge he has, how much every man is indebted to the labours and hints of his predecessers, he will be grateful for the information he receives from any quarter.

This month is not favourable to our observations on the planets, though Saturn and Herschell are in good positions in the evening, but Mercury is in a bad sign for an evening star.

The other planets are morning stars; but Jupiter is, for some time, the only one that will attract attention.

The Moon rises soon after midnight of the 1st, and is seen in the midst of the Hyades; and at five minutes past three in the morning of the 2d passes Aldebaran. On the 3d, she rises under the sixth of the Bull, or tip of the southern horn, and is directing her course towards the thirteenth of the Twins. This star she passes at forty-three minutes past two of the morning of the 4th; consequently, as she rises in the heavens, we shall see above and nearest to her this star, and above it the seventh and twelfth of the Twins: Jupiter, to the east of her, will attract attention before Sun-rise. On the 7th is new Moon, at fifty-five minutes past four in the morning, at which time the Sun suffers an eclipse, but it is not visible in this country; and on the 8th, in the morning, she passes the ecliptick in her ascending node, near to, but to the east of the first of the Lion.

On the 9th, the crescent of the Moon is seen again in the west, in the evening, under the second of the Lion, and to the west of the five stars in triangle. On the 10th, she is perceived to have passed the second of the Virgin, the most western of the last mentioned stars being between this star and the seventh of the Virgin. On the 11th, she is to the east of the five stars in triangle, the third of the Virgin being near to her, but the first at a considerable distance from her to the east. On the 12th, the first of the Virgin is seen under her; and this nautical star may thus be pointed out with great facility. On the 13th, she passes the tenth and eleventh of the Virgin, and at their first appearance is seen to the east of, and nearest to the tenth. On the 14th, she is perceived to have passed between the two first stars of the Balance, being to the east of the line drawn between them. At nine she is seventy-one degrees fifty-four minutes from the first of the Eagle, to the east of her. On the 15th, she is above the second of the Scorpion, which she will pass before Sunrise; and under her, to the east, at some distance, the first of the Scorpion, or nautical star Antares. At nine she is sixty-one degrees twenty-three minutes from the first of the Eagle.

On the 16th, the Moon is on the meridian at fifty-four minutes past six, having under her

Antares, near to the meridian, on the west; and to the east of her, at a considerable distance, Saturn. On the 17th, she is on the meridian at three quarters past seven, having now below her Saturn to the east, and Antares, at a much greater distance, to the west of the meridian. On the 18th, she is on the meridian at thirty-eight minutes past eight, having now below her Saturn to the west, and the small stars of the Archer to the east of the meridian. On the 19th, she is on the meridian at thirty-two minutes past nine, having above her in midheaven, but to the east of the meridian, the first of the Eagle, and near to her to the east the two first stars of the Goat. Saturn is now at a considerable distance from her to the west of the meridian. On the 20th, she is on the meridian at twenty-eight minutes past ten, the two first stars of the Goat being now above her to the west of the meridian, and on the same side, but considerably higher up, and farther from it, the first of the Eagle. At nine she is forty-nine degrees thirty-nine minutes from the first of Pegasus. On the 21st, she is on the meridian at twenty-five minutes past eleven, having above her to the west the second of the Water-bearer, and below her the small stars in the tail of the Goat to the east;

above her are the first of the Water-bearer, with the four small stars in triangle of the Water-pot. At nine she is seventy-six degrees thirty-six minutes from the first of the Ram.

On the 22d is full Moon at one minute before three o'clock in the afternoon, at which time is an eclipse, but invisible to us, for it begins at ten minutes past one, and ends at forty-seven minutes past four. She passes the ecliptick in her descending node during the eclipse, and in the evening rises under the eighth of the Water-bearer. On the 23d, she rises under the four small stars in triangle of the Water-pot, having passed the line drawn through the two western of the four stars in Square and produced. On the 24th, she rises under the four stars in Square, in a line nearly with the two eastern of them, but before midnight she will be perceived to have removed very considerably from that line. On the 25th, she rises under the four stars in Square, in a line nearly with the highest and lowest of these stars. On the 26th, she rises under the three first stars of the Ram, having passed the first sixteenth of the Whale, at eighteen minutes past eight, and she is directing her course close by the second star of that name.

On the 27th, she rises under the three first stars of the Ram, but now nearly in a line with the Pleiades and Menkar, but much nearest to the latter star. On the 28th, she rises under the Pleiades, and is soon seen to be directing her course by the Hyades and Aldebaran, passing the third of the Bull at an hour and three quarters past midnight. On the 29th, she follows Aldebaran in rising, as this star is now to the west of her, and she passed it in the morning. She is soon followed by the sixth of the Bull, or tip of the southern horn, being nearer to this than to the former star at her rising; but she does not pass it till near noon of the next day. On the 30th, she rises near midnight under the sixth of the Bull, and the seventh and twelfth of the Twins, passing, during the morning of the 31st, under the two latter stars, and directing her course above the third of the Twins.

Mercury is an evening star during the whole of the month, being at his greatest elongation on the 17th, and at his stationary point on the 31st. He is, however, in an unfavourable situation, for he traverses the sixth sign, and his latitude, a little more than half a degree north on the 1st, becomes, before the end of the week, southern, and on the last day is upwards of four degrees in that direction. At Sun-set on the 1st, he is to the north of west, about eight degrees above the horizon, and will, therefore, be seen but by few astronomers. When at his greatest elongation, from his depression by southern latitude, he is not so high above the horizon at Sun-set as on the first day; and he is now under the second of the Lion, to the west of the second of the Virgin. This height at Sun-set continues to diminish, and, consequently, he will be rarely seen but by those who have the art of the French astronomer to disengage him almost at any time from the beams of the Sun. They who have globes will notice, in this case, the circumstances attending an unfavourable sign and a southern latitude. The Moon passes him on the 9th.

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Venus is a morning star, but, being in her inferior conjunction on the 1st, will not be visible in the early part of the month. She is stationary on the 23d, being then in the Crab, between the two first of the Twins, and the small stars in the head of the Hydra, having a southern latitude of seven degrees; being in a favourable sign, she is at Sun-rise nearly twenty degrees above the horizon. Jupiter is now above her, and Mars below her. Previous to this time, she will be seen, before Sun-rise, vying with Jupiter in splendour; and towards the end of the month, approaching within ten degrees of him, she will with him attract the attention of the early riser, towards east-north-east, long before Sun-rise, forming a fine contrast with the two first stars of the Twins above them. The Moon passes her on the 6th.

Mars is a morning star, too near the Sun to be visible for the greater part of the month, and at the close of it he is only ten degrees above the horizon at Sun-rise. His motion is direct through twenty degrees, towards the first of the Lion, but he does not pass the star this month, being, however, within a degree of it at the end. The Moon passes him on the 6th.

Jupiter is the morning star, the bright harbinger of day, in the early part, and attaining to a considerable height at Sun-rise before the end of the month. On the 1st, he is upwards of twelve degrees above the horizon at this time, and this height is every day increasing. His motion is direct through eleven degrees and a half, from a point under the two first of the Twins, but to the west of the line passing through them and produced; and he directs his course towards the nebula in the Crab, with a northern latitude of nearly a quarter of a degree. Venus is seen under him on the 13th, nearly in a line with the two first of the Twins; and, from this time, the groupe formed by these stars, the two first of the Lesser Dog, and the two planets, will adorn the eastern sky in the morning. At four o'clock, the following eclipses of his moons may be observed: of the first, on the 14th; of the second, on the 15th; of the third, on the 19th. The Moon passes him on the 5th.

Saturn is on the meridian at twenty-three minutes past nine in the evening of the 1st, and at twelve minutes past eight of the 19th. On the 1st, when on the meridian, he has above him the twelfth to the west, and below him the 11th of the Archer to the east; and as his motion is retrograde through nearly a degree, he will be perceived to be moving slowly nearer to the former, and receding from the latter star. The Moon passes him on the 18th.

Herschell is on the meridian at twenty-one minutes past six in the afternoon of the 1st, and at seven minutes past five of the 21st. His motion is direct through half a degree; and the line between the first of the Balance and second of the Scorpion is our first guide to him; above which are the sixths and the third of the former constellation near the middle, and to the west of the sixths we shall discover our planet. The Moon passes him on the 15th.

The Sun's apparent semidiameter, on the 1st, is thirty-one minutes thirty-five seconds; and, on the 19th, thirty-one minutes forty-one seconds. The Moon's apparent diameter decreases to the 13th, when it is twenty-nine minutes thirty-six seconds; from which time it increases to the 24th to thirty-three minutes four seconds; and then it decreases to the end of the month, finishing with a magnitude of thirty-one minutes six seconds.

The places of the fixed stars, at any hour of the night, may be known by consulting the volume for 1806, according to the following table of positions.

TABLE OF POSITIONS.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VII.	8	42	8	15	7	45	7	12
VIII.	10	47	10	20	9	50	9	17
IX.	0	50	0	23	11	53	11	20
X.	2	45	2	18	1	48	1	15
XI.	4	46	4	19	3	49	3	16
XII.					5	55	5	22

SEPTEMBER, 1812.

THE nautical stars this month are the first of the Eagle, Fomalhaut, the first of Pegasus, of the Ram, Aldebaran, the second of the Twins, Regulus, Spica, and Antares. Of these, the five first and Antares will come under our observation in the evening. At first, on the first appearance of the stars, there will be two nautical stars to the west of the meridian, Spica and Antares, and two to the east, the first of the Eagle and of Pegasus. Spica, being near to the horizon, in west-south-west, soon disappears; and Antares will be known by the marks already given of this star, which at nine o'clock is in the horizon. At this time the first of the Eagle is on the meridian; and, coming to it earlier every evening, we shall, at the times noted in the table at the end of this month for the eighth position, see it near to the meridian with advantage. At these times you cannot fail of distinguishing this star in mid-heaven, and the first of Pegasus, now in the upper region, by the marks already given of these stars, and by what you have, from previous observation, formed for yourself.

At the end of the month, the ninth position is favourable to our observations, as on the 16th it is at ten o'clock; and then we have only one nautical star to the west of the meridian, namely, the first of the Eagle; and four to the east of the meridian, namely, Fomalhaut, the first of Pegasus, of the Ram, and Aldebaran. Fomalhaut and Aldebaran are both near the horizon, the former in south by east, the latter near east-north-east. The latter you know by the small stars around it, and the Pleiades above it. Fomalhaut is distinguished, when the four stars in Square are visible, by being in the right line nearly with the two western of them, and nearest to the first of Pegasus. It is seldom that you see Fomalhaut to advantage; but when you have a clear horizon in the south, at the times mentioned for the ninth position, you will perceive to the west of Fomalhaut two stars, one of the third, and the other of the fifth magnitude, which, being impressed on your memory, will completely distinguish this star from any other of the first magnitude; and, consequently, you will, in the proper seasons, easily discover this nautical star. The first of the Ram, being midway nearly between the four stars in Square and Aldebaran, will frequently fix your attention. You will familiarise yourself with the objects near it, such as the small stars in the Fly, above the line between this nautical star and the Pleiades, but nearest to the star; as also the triangle, midway between the star and the third of Andromeda, the most eastern of the three stars in line of the second magnitude, above this nautical star.

I have noticed the propriety of every one who remarks a peculiar appearance in the heavens sending an account of it to some one versed in astronomy, as every observation, particularly of persons in different latitudes, is of importance. This was particularly the case with the comet, which, in this month last year, excited so much of the publick attention. It had been previously seen in southern latitudes, as well as in France, in the spring; and many persons on the seas, must, when walking the deck, have contemplated, with great satisfaction, so interesting an object. It was entered also in the log-books, probably, but with no other observation than simply; observed the comet: yet what a valuable stock of information might we not have collected, if there had been added its distance from a few of the fixed stars, taken by those methods by which the navigaters of the vessels in the service of the East India Company are so much distinguished. Thus each vessel, on its return home, might have communicated to the Observatory at Greenwich, a fund of materials, from which the path of the comet would be accurately ascertained, and those questions solved, for which the publick expressed too early a solicitude.

Scarcely had the comet appeared a few evenings, when it was asked; what is its distance—what its use—what the time of its revolution round the sun—where is it going—how long will it be visible? They who asked these questions were little aware of the difficulty of answering them, and that they who are the most capable, would be most diffident of their powers in a process, in which a very small errour in observation is productive of so great errours in the calculation. The first thing was to determine, by various observations, its apparent path. This could not be done in a short time, and each observer, who had from bad weather lost a few nights' observations, would be very glad to have the defect made up by the observations of any astronomer under a more favourable sky. The month, upon the whole, afforded excellent opportunities, as did the following one, for making accurate observations, but great differences appeared in the result of them from different astronomers.

The fact is, that the ascertaining of the path of a comet is one of the most difficult things in astronomy. You will easily conceive this, when you consider, that the path of a planet, which has been so often the subject of observation, was not obtained without great labour and repeated trials. The comet is seen in only a small part of its orbit, and thence we are to determine the whole of it. We know not the shape of it, but make at first a rude conjecture, and correct it by repeated trials. The earth is moving in one plane, the comet in another, and sometimes, as was the case of this comet, in one, making a considerable angle with the plane of the earth's orbit. We can make this appear by a thread, and a piece of paper cut in the form of the path, which the comet is supposed to describe. The real path is an ellipse, whose form, and mode of making one, have been already described; but the ellipse, in which the comet moves, is very different from that of the planets. The planetary ellipse is very nearly a circle: the path of the comet resembles more a different figure, to which is given the name of a parabola.

This figure may be seen in a loaf of sugar, or any cone cut in a peculiar manner. The bottom of the loaf is circular: if we cut it aslant, so that the pieces, when joined together again, shall have their sections curvilinear, then the figures, by which the lower part of the smaller segment, and the upper part of the lower segment, are bounded, are ovals, by the name of an ellipse. But if we take a ruler, and place it close to the cone, from the top to the bottom, and then cut off two segments, by a line parallel to this ruler, then the extremity of each segment will be a figure called a parabola. It will be obvious to you, in considering these operations, that as the ellipse differs more and more from the circle, as the cone is cut more and more aslant, so i approaches more and more to the parabola, as the line by which the figure is cut approaches more and more to the direction of the ruler.

You may amuse yourself by making the figure of a parabola on paper, by taking a common ruler, and a piece of thread of the length of the ruler; and, fixing one end of the thread to the smaller end of the ruler, draw the thread straight to the other end, and place this last end in a straight line drawn for the purpose. Fix now a pin in the paper, any where close to the thread, and fix its loose end by this pin to the paper. Move a pencil up the thread till it is kept tight, in which case the thread between the pin and the pencil will be of the same length with the part of the ruler, from which the thread is detached; and move the ruler parallel to itself, keeping the thread close to the ruler by means of the pencil; in which case, the distance of the pencil from the pin will always be of the same length as that of the part of the ruler, from which the thread is detached, and the figure marked out by the pencil is a parabola.

According to the distance of the pin from the line first drawn, will be the nature of the parabola; and by comparing what has now been said, with the mode for drawing an ellipse, in page 196 of the volume for 1808, you will see that the parabola will resemble an ellipse, in which the diameter is of a very great length, and the distance between the pins very nearly equal to it. Now such an ellipse not being easily made, and a parabola being, by the method above described, very easily formed, we use the latter in cases of comets, in the first instance, in preference to the former; and, for the comet under consideration, some peculiar advantages attend the use of it. The comet, at its nearest distance from the Sun, was as far from it only as the earth is, and; if the comet moved in a parabola, and its nearest distance from the Sun was exactly equal to that of the mean distance of the earth from the Sun, we could make a figure to represent exactly the comet's path, and apply it to the orbit of the earth.

To do this, draw a circle, with any radius you please, to represent the earth's orbit, and in making the parabola, let the distance of the pin, from the line drawn in the first instance, be double of this radius. Then move your ruler and pencil, and the figure the latter describes will be the path of the comet. Cut out the paper according to this line, and apply it to the circle of the earth; and, if this is done properly, a line may be drawn from the earth ball to the comet ball, which shall point to the position of the comet in the heavens, agreeably to the stars supposed to be in the plane of the earth's orbit, and those above it. But as the first thing to be done is, to form an idea of a parabola, and to make one, I leave you for the present to that exercise.

This month is favourable to observations on the planet Saturn in the evening. Herschell is approaching too near the horizon. The other planets, except Mercury, are morning stars, and he is an evening star only in the former part of the month.

The Moon is seen, in the morning of the 1st, to the east of the third of the Twins, having under her Jupiter and Venus, and making with them and the two first of the Twins a beautiful groupe before Sun-rise. On the 2d, she is perceived to have approached the two planets, which she does not pass before Sun-rise. On the 3d, she is under the two planets; and on the

5th, at twenty-two minutes past seven afternoon, is new Moon, attended with an eclipse of the Sun, invisible to us. She passed the ecliptick, in her ascending node, in the afternoon of the preceding day.

On the 7th, the crescent of the Moon is near the horizon after Sun-set, under the third of the Virgin, which star she passes at thirty-one minutes past eight in the evening. On the 8th, she is between the first of the Virgin and the five stars in triangle; but the former star will be near the horizon when the stars appear. On the 9th, she is between the first of the Virgin and the tenth and eleventh of this constellation, but nearest to the two latter stars. On the 10th, she is seen to have passed the two latter stars, and to be directing her course between the two first stars of the Balance, the first being nearest to and below her. On the 11th, she is seen to have passed the two first stars of the Balance, being to the east of the third, and passing the seventh of this constellation at eight o'clock. On the 12th, she is seen above the second and the first of the Scorpion, thus pointing out the nautical star to every observer. To the east of her, at a considerable distance, is

Saturn. On the 13th, she is seen above the line between Antares and Saturn, but nearest to the planet.

On the 14th, the Moon is on the meridian at thirty-four minutes past six, Saturn being under, but a little to the east of her. On the 15th, she is on the meridian at twenty-seven minutes past seven, Saturn being now below her at some distance to the west, and the two first stars of the Goat at a greater distance to the east of her. The nautical star, the first of the Eagle, is above her, but to the east of the meridian. On the 16th, she is on the meridian at twenty-one minutes past eight, the two first stars of the Goat being near to, and above her to the east; and the nautical star, the first of the Eagle, at a considerable distance above her, but to the west of the meridian. At nine she is fifty-three degrees fifty-two minutes from the first of Pegasus to the east of her. On the 17th, she is on the meridian at seventeen minutes past nine, the two first stars of the Goat being below her to the west, and the second of the Water-bearer above her to the east of the meridian. At nine she is forty-one degrees fifty-one minutes from the first of Pegasus. On the 18th, she is on the meridian at thirteen minutes past ten, having directly above her the first of the Water-bearer, and to the west the second of this constellation. Between her and the nautical star, the first of Pegasus, to the east of the meridian above her, we notice the four stars in triangle of the Water-bearer. On the 19th, she is on the meridian at nine minutes past eleven, having directly above her the two western of the four stars in Square, and, consequently, the nautical star, the first of Pegasus, nearest to her. Very early in the morning, she passed the ecliptick in the descending node, but not near enough to full Moon to produce an eclipse.

On the 20th is full Moon, at fifty-one minutes past eleven at night, but without an eclipse, as she is two degrees and a half south of the ecliptick. She rises under the four stars in Square, within the lines drawn through the two eastern and the two western stars, and produced; but nearest to the line passing through the two eastern stars. On the 21st, she rises under the four stars in Square, in a line with the highest and the lowest; and is perceived, in the night, to be directing her course through the space between the first of the Ram and Menkar, but nearest to the latter star. On the 22d, she rises under the space between the four stars in Square and the three first of the Ram, but nearest to the latter stars. On the 23d, she rises under the three first stars of the Ram, and nearly in a line with the first and Menkar, from which line she is seen rapidly travelling during the night towards the Hyades. On the 24th, she rises under the Pleiades, and is seen afterwards to have passed the line between these stars and Menkar. On the 25th, she rises soon after Aldebaran, having passed him in the afternoon. On the 26th, she rises under the sixth of the Bull, and is seen, during the night, above the head of Orion. On the 27th, she rises soon after the third of the Twins, having passed this star near Sun-set. On the 28th, she rises near midnight, under the two first stars of the Twins; and is seen, during the morning of the 29th, to have passed the line between the second of the Twins and the first of the Lesser Dog, Jupiter being to the east of her. On the 30th, she rises in the morning, under the two small stars and nebula of the Crab and Jupiter, and is seen afterwards to be evidently directing her course to the first of the Lion.

Mercury is invisible in the former, and a morning star in the latter part of the month, being in his inferior conjunction on the 13th; stationary on the 23d; and at his greatest elongation on the 29th. In the former part, he is invisible, from the unfavourableness of his position; being, on the 1st, to the east of the second of the Virgin, having passed the line drawn from the second of the Lion to this star, and produced, with a southern latitude of four degrees. At Sun-set, therefore, he will be in the horizon, and under the horizon in a few days after at Sun-set. But what was his disadvantage in the former, is to his advantage at the latter part of the month. He is in the same sign, the sixth, which in the morning is favourable to the elevation of a planet, so that, on the day of his greatest elongation, he will be sixteen degrees above the horizon at Sun-rise; and, consequently, for several preceding days, will be seen before the dawn of day, in the east. The Moon passes him on the 6th.

Venus is a morning star, shining brilliantly in the east before Sun-rise, and, with Jupiter above her, attracting the attention of the early riser; and before the close of the month Mars, under her, will add to the interest of the scene.

She moves with a direct motion through twenty degrees, being, on the 1st, in a line nearly with the two first stars of the Twins, Jupiter being to the east of that line above her. On the 8th, she is nearly in a line with the two small stars, the third and fourth of the Crab, between which you have frequently noticed the nebula. She is directing her course towards the first of the Lion, gradually approaching the ecliptick, and rapidly receding from Jupiter. On the 27th, she passes the fourteenth of the Lion, this star being forty-four minutes south of her; and she advances thence towards the first of the Lion, but does not pass the star this month. Towards the close of the month, the two first of the Twins, Jupiter, Venus, the first of the Lion, and Mars, form an assemblage in the east, which will be noticed by the commonest observer. The Moon passes Venus on the 2d.

Mars is a morning star, too near the Sun to be seen in the early part of the month, but, being in a favourable situation, he will, by the middle of the month, have emancipated himself from its beams, and be seen near the horizon, before Sun-rise, in the east. On the 1st, he passes the first of the Lion, the star being forty-two minutes south of him; and he moves from this star, with a direct motion, through nineteen degrees, ending at a point under the eighteenth of the Lion. The Moon passes him on the 4th.

Jupiter is a morning star, at a considerable height above the horizon at Sun-rise, seen first to the east of the line drawn through the two first of the Twins, above Venus, and moving with a direct motion through five degrees, but stopping short of the fourth of the Crab; this star, with the nebula above it, being thus pointed out at the close of the month by the planet. From the southern latitude of Venus, she is at a considerable distance from him at first, and this distance increases every day. The Moon passes him on the 2d.

Saturn is on the meridian at twenty-three minutes past seven, on the evening of the 1st, and nineteen minutes past six of the 19th. He is stationary on the 4th, from which day his motion is direct through half a degree. We shall see him, therefore, when on the meridian, nearly in the same position; the twelfth of the Archer above him to the west, and the eleventh below him to the east of the meridian. His reign above the horizon extends from the south-east to the south-west, in the lower region, chiefly the lower part; where, from Sun-set to his setting, he will have no one but Antares to vie with him in splendour; and when he is on the meridian, this nautical star will be verging towards the horizon, considerably to the west of him. The Moon passes him on the 14th.

Herschell is on the meridian at twenty-eight minutes pas four, in the afternoon of the 1st, and at nineteen minutes past three of the 21st; and, consequently, from his position in the eighth sign, his stay above the horizon, after Sun-set, is short at first, and daily decreasing. His motion is direct through a degree and a quarter, being under the third and sixth of the Balance, and to the west of the line drawn through these stars. The Moon passes him on the 11th.

The apparent diameter of the Sun, on the 2d, is thirty-one minutes forty-seven seconds; and on the 20th, thirty-one minutes fifty-five seconds. The apparent diameter of the Moon decreases to the 9th, when it is twenty-nine minutes and a half; from which time it increases to the 21st, when it is thirty-three minutes twenty-six seconds; decreasing afterwards to the end of the month, and finishing with a magnitude of thirty minutes sixteen seconds.

To discover the stars, from their positions, at any time of the night, consult the volume for 1806, according to the following table.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
VII.	6	46	6	21	5	52		
VIII.	8	51	8	26	7	57	7	28
IX.	10	54	10	29	10	0	9	31
X.	0	49	0	24	11	55	11	26
XI.	2	50	2	25	1	56	1	27
XII.	4	56	4	31	4	2	3	33
I.	6	46	6	21	5	52	5	23

OCTOBER, 1812.

THE nautical stars this month are the first of the Eagle, Fomalhaut, the first of Pegasus, of the Ram, Aldebaran, the second of the Twins, the first of the Lion, and Antares. The first of the Eagle is on the meridian at first about seven in the evening, and, of course, during this month, you will have frequent opportunities of noticing it and the stars around it, as it journies from the meridian to the western horizon. Near nine, at first, the ninth position * claims our attention, and at a later time every evening; so that at the time marked in the table, we shall every evening have, if it is a clear night, a good opportunity of distinguishing the nautical stars then above the horizon. For the account of them, let me refer you back to the last month, page 140.

The tenth position is favourable for our ob-

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* Volume for 1806, page 245.

servation only at the end of the month at nine o'clock, but then Fomalhaut, with which you will form a particular acquaintance, this month, is at the west of the meridian. This star is, however, with the two western of the four stars in Square, on the meridian, in the middle of the month, at half past nine; and as two nautical stars are on the meridian, this peculiar position will, at an earlier time every evening, claim your attention. At this time, there is only one nautical star west of the meridian, and three nautical stars to the east of it; the first of the Ram, Aldebaran, and the second of the Twins, the latter nearly in the horizon in the north-east. Fomalhaut is too near the horizon to be often visible in our hazy climate; and, therefore, when it is clear, you will not lose the opportunity, in the earlier part of the evening, of examining the horizon, from the south, to south and south-east, for this nautical star. On the 1st of the month, at ten o'clock, it is in a peculiarly good situation, as at that time the third of the southern Fish is on the meridian, and the second below it to the west. As the former is only of the fifth, and the latter of the third magnitude, and they are the chief accompaniments of this nautical star, it is well to have them in the best position; and, consequently, by looking every evening four minutes earlier to the south, near the horizon, we shall have this advantage.

I presume that you are now able to make a parabola, and if you have made a circle for the earth's orbit, about six inches radius, and a corresponding parabola, as described last month, you are prepared for observing the motion of a comet. I suppose that the parabola is cut out of the paper, and the first thing that will strike you is, the difficulty of placing it on the paper delineating the earth's orbit. And here a little exercise may be amusing. In the first place, you are now very well acquainted with the meaning of the word node; knowing that it denotes the point in the ecliptick, where the orbits of a planet, or the Moon, and the earth, intersect each other. The same is true of a comet, and as the comet did not move in the same plane as the earth, our parabola must be placed so as to make some angle with it, and if that angle is ascertained, the thing will be easily executed, provided we know where the node is. At this moment, that I am writing, the inclination of the comet's orbit to the earth's orbit, is given at seventy-two degrees and forty-two minutes, but probably, when the results of all the observations have been taken, this quantity may undergo some change.

Supposing the inclination to be as above stated, our parabola is to be inclined to the earth's orbit, by an angle of seventy-two degrees forty-two minutes. But we shall not know how to place the paper, unless we have the point of the node, and this is stated at a hundred and forty degrees thirteen minutes longitude. Hence, if we have marked the circle of the earth, according to the signs, we are to take a point at this distance from our first point, or first of Aries, for the place, in which the plane of our parabola is to cut that of our circle; and, having fixed our parabola with the angle above mentioned, and passing through the points denoting its longitude at the node, and the opposite point to the circle in it, we are prepared to say that the comet moved somewhere in the plane of the parabola, but it does not by any means appear, as yet, that it moves in the line we have delineated for the parabola.

The question is how the curve of the parabola is placed with respect to the earth's orbit, as it may be various ways; and the easiest mode of determining the right one is, to consider the situation of the parabola, when the comet is at the shortest distance from the Sun. In the present case, we suppose this distance equal to the radius of the earth's orbit. We are to place the parabola, therefore, so that the place where the pin was fixed in making it, being applied to the centre of the earth's orbit, or plane of the Sun, the shortest line from that point to the curve shall be directed to the place where the comet would appear to be, to an observer placed in the Sun at the time, that the comet was at its shortest distance from it. This distance is called, from a Greek word, the perihelion distance, the word helios, or helion, being Greek for the Sun, and peri meaning near about it. As when the comet is at its greatest distance, it is said to be in its aphelion, or distance off from the Sun. These two distances, in comets, bear very different proportions to each other, whereas in a planet they are nearly equal.

If you have placed your parabola right, and the point of the perihelion has its due place in the heavens, then, on the day in which the comet was in that place, you will fix the earth ball in the proper place in its orbit. A line then drawn from the earth ball to the comet ball will point to a very different place in the heavens. As the earth moves a certain distance every day, and the comet performs also a similar motion, fix the earth ball to its proper place the next day, and draw a line from it over your parabola, to the point in the heavens where the comet was seen on that day at the same time, and thus you will observe how far the comet moved in its orbit in a day; and, following the same operation every day, you will have a sufficiently clear idea its motion. You cannot fail of observing, however, how much depends on the perihelion place being properly ascertained, and from this attempt may form some idea of the difficulty with which a comet's orbit is ascertained.

Two of the planets only are visible in the evening, Herschell and Saturn: the former, however, is too near the horizon to be seen with advantage; and the opportunities of seeing Saturn, in favourable positions, are daily decreasing. The eastern hemisphere, however, in the morning, displays Jupiter and Venus to great advantage; and in the early part, Mars and Mercury, near the horizon, will add their splendour to the eastern sky.

The Moon is seen, in the morning of the 1st, under Venus and Jupiter, and above the first of the Lion, being near to the star, as she passes it in the afternoon. Before Sun-rise Mercury, with Mars under the Moon, will make the morning view of the eastern sky very interesting. On this day, at night, she passes the ecliptick, in her ascending node, without an eclipse, for obvious reasons. On the 2d, she is seen under the first of the Lion. On the 3d, she is observed to have approached considerably nearer to Mars and Mercury; and on the 4th, her crescent may be seen under them before Sun-rise. On the 5th, is new Moon, at ten minutes after noon, but without an eclipse, as she is upwards of three degrees and a half north of the ecliptick.

On the 8th, the Moon is seen in the evening, in south-west, under and near to the third of the Balance, as she passes this star before midnight. On the 9th, she is above the second of the Scorpion, having passed this star since noon: below her we notice the nautical star, Antares, and to the east of her Saturn. On the 10th, she is seen to have receded considerably from Antares, but Saturn is still considerably to the east of her. On the 11th, she is on the meridian at thirty-six minutes past four, Saturn being below her to the east of the meridian, and she will evidently have passed him before her next appearance. She is directing her course above the two twelfths of the Archer. On the 12th, she is on the meridian at twenty-seven minutes past five, having under her the small stars in the head of the Archer, and now Saturn is below her to the west of the meridian. On the 13th, she is on the meridian at nineteen minutes past six, having the two first stars of the Goat above her to the east, and the small stars in the head of the Archer below her to the west of the meridian. Directly above her, at a considerable distance, is the nautical star, the first of the Eagle; and at six she is fifty-nine degrees forty-two minutes from the nautical star, the first of Pegasus, in the lower part of the middle region, near east-south-east. On the 14th, she is on the meridian at twelve minutes past seven, the two first stars of the Archer being now above her to the west of the meridian; and at six she is forty-seven degrees fifty-eight minutes from the first of Pegasus.

On the 15th, the Moon is on the meridian at six minutes past eight, having almost directly above her the second of the Water-bearer, and below her the four small stars in the tail of the Goat. On the 16th, she is on the meridian at nine, having above her the four small stars in triangle of the Water-pot; and we shall not fail of noticing, considerably above her, but to the east of the meridian, the two western of the four stars in Square, the nautical star, the first of Pegasus, being the lowest; and near the horizon, in a direct line almost with them, the nautical star, Fomalhaut. On the 17th, she is on the meridian at fifty-five minutes past nine, being directly under the four stars in Square, the two western being to the west, and the two eastern to the east of the meridian. You will now notice the nautical star, the first of Pegasus, being the lowest of the two western stars; and Fomalhaut, the other nautical star, near to the meridian to the west, and to the horizon. On the 18th, she is on the meridian at fifty minutes past ten, being under the two eastern of the four stars in Square, which are near to the meridian on the west: to the east of her we notice the three first stars of the Ram. On the 19th, she is on the meridian at forty-six minutes past eleven, having above her, to the east of the meridian, the three first stars of the Ram, and the first, the nautical star, will be clearly distinguished, notwithstanding her superiour splendour. To the east of her is the thirteenth of the Fishes, to which she is directing her course; and on the morning of the 20th, she passes over it, the occultation commencing at twenty-seven minutes and a half past three; the star being two minutes north of the centre, and ending at twenty-eight minutes past four, the star being two minutes and forty seconds north of the centre. At fifty-one minutes past eight is full Moon, but without an eclipse, as she is three degrees and a half south of the ecliptick. At night she rises under the three first stars of the Ram, and is seen afterwards between them and the small stars in the head of the Whale. She is directing her course to the twelfth of this constellation, the star to the west of the line between the first of the Ram and the first of the Whale; and before she sets it will suffer an occultation.

This occultation takes place at twenty-one minutes and a quarter past five, in the morning of the 21st, when the star is twelve minutes and thirty seconds south of the Moon's centre, and it ends at one minute and three quarters past six, the star being eleven minutes twenty seconds south of the centre. At night we perceive that she is at some distance from this star, rising under the three first stars of the Ram, and directing her course through the Hyades; in her way she passes the star in the Bull called *f*, which suffers an occultation at fifty-four minutes and a half past nine, the star being six minutes south of the centre; and it emerges at fifty minutes and a quarter past ten, being then eight minutes and three quarters south of the centre. On the 22d, she rises between the third of the Bull and Aldebaran, as she passes over the former star at thirty-three minutes and a half past five, the star being thirteen minutes and a half north of the centre; and it emerges at fifty-nine minutes past five, the star being thirteen minutes and a quarter north of the centre. At one minute past eight she passes by the first fourth, and at twenty-six minutes past eight the second fourth, and at fifty-seven minutes past eleven Aldebaran suffers an occultation, being then eleven minutes and a half north of the Moon's centre; and at fifty minutes and a quarter past midnight it emerges, being then eight minutes and a half north of the centre. During the night, therefore, these appearances will occasion considerable interest with astronomers, and the general observer will be struck with the splendour of Orion, under the Moon, and the singularity of the sudden disappearance and reappearance of Aldebaran.

On the 23d, the Moon rises below the sixth of the Bull, at a considerable distance from Aldebaran, but she does not pass the former star till after midnight; and when she is on the meridian, it will be seen to the west of her, and Orion directly under her. On the *24th*, she rises under the seventh and twelfth of the Twins, and to the west of the thirteenth, as she passes this star at two minutes past ten: Jupiter, Mars, and Venus, to the east of her, will excite our attention before she sets. On the 25th, she rises under the two first stars of the Twins, and considerably to the east of the third: she is directing her course under Jupiter. On the 26th, she rises under the two first of the Twins, being almost in a direct line with them, and we know the nautical by its being the lowest star. She is followed by Jupiter, and her progress towards him will amuse the traveller in the night, but he will not see her pass him. On the 27th, she rises under Jupiter, and during the morning of the 28th, will be seen directing her course towards the first of the Lion; and before

Sun-rise Jupiter, the Moon, the first of the Lion, Venus, and Mars, will form a splendid appearance in the eastern sky. She passes the ecliptick, in her ascending node, between eleven and twelve at night, but, for obvious reasons, without an eclipse. On the 29th, she rises under the first of the Lion, having passed this nautical star at forty-four minutes before one in the morning: she will be seen to direct her course towards Venus. On the 30th, she rises before Venus, and her progress towards this planet will strike the traveller. On the 31st, she rises under Venus, as she passed the planet at fifty-seven minutes past one in the morning, and she is soon followed by Mars; and her recess to one, and advance towards the other, will be striking to the early riser.

The evenings this month are not favourable to our observations on the planets, as only two are above the horizon, during the greater part of the night, at this time, Mercury being so only for a few days at the end. On the other hand, Jupiter, Venus, Mars, and Mercury, form a splendid appearance in the heavens in the morning.

Mercury is in his superior conjunction on the

28th, a morning star previously, and his duration above the horizon, before Sun-rise on the 1st, is above an hour and three quarters, but this is daily decreasing. He is seen in the east under Mars, but moving rapidly from him, with a direct motion. For the first week we shall be struck with the appearance of the four planets, Mercury, Mars, Venus, and Jupiter, in the order mentioned, Mercury being the lowest of them. The Moon passes him on the 4th.

Venus is a morning star, at her greatest elongation on the 11th. She moves with a direct motion through thirty-one degrees, from a point to the east of the first of the Lion, to a point to the west of the second of the Virgin, but very near to it. We shall first compare her with Jupiter above, and the first of the Lion below her; and in her progress through the Lion, note her passage by the seventeenth of this constellation, which star she passes on the 13th, being forty-four minutes south of it. Her recess from Jupiter, and slow approach to Mars, will form a considerable feature in this month. The Moon passes her on the 31st in the morning.

Mars is a morning star, his duration above the horizon, before Sun-rise, daily increasing, at first being about two hours. His motion is direct through nineteen degrees and a half, from a point east of the nineteenth of the Lion, to the point nearly under the middle of the line between the seventh and third of the Virgin. On the 14th, he passes the second of the Virgin, this star being twenty-seven minutes to the south of him: and, on the 26th, the seventh of this constellation, the star being fifteen minutes north of him. At first, he is only about four degrees and a half from Mercury, who is below him, but this distance rapidly increases, whilst that from Venus is diminishing. As the height of Mars above the horizon increases, his inferiority in splendour to Venus will be very apparent. Venus being between Jupiter and Mars, may be compared with each, and the difference in the light and colour of these planets will be very evident. The Moon passes Mars on the 3d.

Jupiter is a morning star, but, before the end of the month, he is on the meridian at Sun-rise. His motion is direct through three degrees and a half, from the Nebula in the Crab, through the line between the third and fourth of this constellation. The latter star he passes on the 12th, the star being eighteen minutes south of him. The two first stars of the Twins, above him, with the first of the Lesser Dog and the Lion, form a fine groupe above Venus, Mars, and Mercury, whilst the latter is visible. The Moon passes Jupiter on the 27th.

Saturn is on the meridian at thirty-eight minutes past five in the afternoon of the 1st, and a quarter past four of the 25th; and being in the beginning of the tenth sign, his arc between the meridian and the horizon is small, and his duration above the horizon after Sun-set daily diminishes. His motion is direct through two degrees. At first, when on the meridian, he has above him the twelfth of the Archer to the west, and the eleventh below him to the east, but before the end of the month the latter star is directly under him, when he passes the meridian. The Moon passes him on the 12th.

Herschell is so low in the horizon at Sun-set that he will not be in a favourable situation the whole month for observation. His motion is direct through a degree and three quarters. He is under the third and sixths of the Balance, and passes the line drawn from the former through the latter stars. The Moon passes him on the 8th.

The Sun's apparent semidiameter, on the 1st, is thirty-two minutes two seconds; and, on the 19th, thirty-two minutes twelve seconds. The Moon's apparent diameter decreases to the 7th, when it is twenty-nine minutes twenty-eight seconds; from which time it increases to the 20th, being then thirty-three minutes thirty-four seconds; and from this time it decreases to the end of the month, finishing with a magnitude of twenty-nine minutes thirty-four seconds.

The positions of the fixed stars will be known by consulting the volume for 1806, according to the following table.

TABLE OF POSITIONS.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VIII.	7	3	6	38	6	8	5	34
IX.	9	6	8	41	8	11	7	37
X.	11	1	10	36	10	6	9	32
XI.	1	2	0	37	0	7	11	33
XII.	3	8	2	43	2	13	1	39
I.	4	58	4	33	4	3	3	29
II.					6	6	5	32

NOVEMBER, 1812.

THE nautical stars this month are Fomalhaut, the first of Pegasus, of the Ram, Aldebaran, the second of the Twins, the first of the Lion, Spica, Antares, and the first of the Eagle. During this month Fomalhaut presents himself in such a manner, that he cannot fail, when the evening is favourable, to make an impression on your memory. At eight o'clock, on the 1st, he is near the meridian to the east, as his two companions, the third and second, are to the west of it. You will note, at the same time, the first of the Eagle, the only nautical star, to the west; and the first of Pegasus, of the Ram, and Aldebaran, to the east. The first of Pegasus is now high in the middle region near the meridian.

At nine nearly you see the four stars in Square, the two western to the west, and the two eastern to the east of the meridian, as described in the tenth position*; and, at the times indicated in the table, you will make, to advantage, your remarks on the nautical stars in this position. To the west of the meridian are the first of the Eagle, first of Pegasus, and Fomalhaut. Two of the first magnitude, and one of the second, all easily distinguished by the marks already given. To the west are the first of the Ram, Aldebaran, and the first of the Twins. One of the first and two of the second magnitude. The second of the Twins, being near the horizon in the north-east, will be known at once by its companion above it. Aldebaran, by his surrounding small stars and Pleiades above it, will be remembered from the frequent allusions made to them; and the first of the Ram, in midheaven, between the Pleiades and four stars in Square, cannot be mistaken; and the two stars near it, of the third and fourth magnitudes, will point out this nautical star without a possibility of mistake.

At the end of the month, the first of the Ram is on the meridian between nine and ten; and the times are noted in the table for the eleventh position. The four stars in Square are now in the west; and the nautical star, the first of Pegasus, is the lowest of them, to be particularly remarked in this situation, that you may remember it in other climates. Aldebaran and the second of the Twins are the only nautical stars to the east of the meridian. You will compare Aldebaran with the stars of the first magnitude in Orion below it, and perceive that there is no possibility of mistaking the one for the other. The Twins, in the upper part of the lower region, in east-north-east, will be distinguished from all other stars: our nautical star, the second, is the lowest of them; and you will recollect also that it is the farthest of the two from Capella, the star of the first magnitude at some distance above it.

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* Page 251, volume for 1806.

If you have tried the scheme, proposed last month, for tracing the path of the comet in the heavens, you will not join in the remark, that was made last year, in the supposed want of attention in principal astronomers, to gratify the expectations of the publick, on every thing relative to this important appearance. You will have perceived, how great may be an errour, from an uncertainty on several points. If the perihelion distance is not well ascertained, your figure will be entirely inapplicable; and, if it is right, but its position is not duly fixed, your curve will not be properly adjusted. Judge, then, what difficulties an astronomer has to contend with; and you will not be surprised, that men of real note in the science should be very backward in producing the result of their observations, and that they should wait till they could delineate the path with such proofs, as should be generally satisfactory.

You will reflect on the different operations performed by yourself and the astronomer. The latter is to discover the figure, which is supposed to be given to you, and which you have only to make and adjust. The astronomer discovers or receives intelligence of the appearance of a comet. He endeavours, by various nice processes, by excellent instruments, to fix its apparent situation in the heavens. This he does by measuring its distances from several fixed stars, and its altitude above the horizon at certain times. If he has been fortunate in his weather, this will be done to a very considerable degree of accuracy; and he has now the apparent place of the comet, we will suppose, for every night, that it was above our horizon and visible, with or without a telescope.

All this being completely done, he has only the apparent place; and, to obtain the real path of the comet, he must consider it as seen by a spectater in the Sun. To do this, he must know the place of the earth at each time of observation, and its distance from the Sun. He has to form his conjectures, on the distances of the comet from the Sun, by means of an imagined parabola; and this figure, to be exact, is afterwards to be converted into an ellipse. All this is to be done by rules, on which the most scientific men have exerted the utmost of their sagacity; and, after all, there is room for great improvement in them. It is some time, then, before these necessary things can be performed to the satisfaction of the astronomer employed upon them; and the length of time before the comet will return again, forbids him to expect, that he shall see his conjectures realised: and posterity is the only judge whether the orbit has been ascertained.

Venus and Mars are morning stars this month.

Jupiter rises in the night. Mercury and Saturn are evening stars. Herschell passes the Sun.

The Moon rises in the morning of the 1st, nearly at the same time with Mars, whom he passes this day, and Venus above forms with them a beautiful groupe. She is above, and they are nearly under the five stars in triangle of the Virgin. On the 2d, she rises under the five stars in triangle of the Virgin. at a considerable distance from Mars; and on the 4th is new Moon, at fourteen minutes past six in the morning, but without an eclipse, as she is four degrees and three quarters north of the eclipticк.

On the 6th, the crescent of the Moon is seen in the south-west, Saturn being above her to the east. On the 8th, she is seen above Saturn, having passed the planet about noon. On the 9th, she is on the meridian at seventeen minutes past four in the afternoon, the small stars in the Archer being below her to the west, and the two first stars of the Goat above her to the east, Saturn being considerably to the west of her. On the 10th, she is on the meridian at eight minutes past five, the two first stars of the Goat being above her, and the nautical star, the first of the Eagle, very considerably above her to the west of the meridian. On the 11th, she is on the meridian at six, the second of the Water-bearer above her to the east of the meridian, and the two first stars of the Goat at a considerable distance from her to the west. On the 12th, she is on the meridian at fifty-one minutes past six; having above her the first of the Water-bearer and the four stars in triangle: but at a great distance, higher to the east, the four stars in Square, the nearest to her being the nautical star, the first of Pegasus. On this day she passes the ecliptick, in her descending node, soon after noon, but, for obvious reasons, without an eclipse.

On the 13th, the Moon is on the meridian at forty-three minutes past seven, having now above her the two western of the four stars in Square, at a considerable distance, but near to the meridian on the west, the nautical star, the first of Pegasus, being the nearest to her. The nearest stars above her to the west of the meridian, are the four stars in triangle of the Water-bearer. At three quarters past ten, she passes the twenty-first of this constellation, the small star on the eastern brink of the stream from the Water-pot. On the 14th, she is on the meridian at thirty-six minutes past eight, having above her the four stars in Square, the two western on the western side of, but the two eastern on the eastern side of, and nearer to the meridian. We shall distinguish the nautical star, the first of Pegasus, by seeing the lowest of the two western stars, and by the other marks near to it. On the 15th, she is on the meridian at twenty-nine minutes past nine; at which time we observe the four stars in Square considerably above her and to the west of the meridian; the three first stars of the Ram being above her, and at a greater distance to the east of it. On the 16th, she is on the meridian at twenty-four minutes past ten; being now below the three first stars of the Ram, and the nautical star, the first of this constellation, will be easily pointed out to any observer. Below her, to the east of the meridian, and at a considerable distance, is Menkar, with the small stars in the head of the Whale. On the 17th, she is on the meridian at twenty minutes past eleven, having now directly below her Menkar, with the small stars in the head of the Whale; the Pleiades being above her to the east, as are the three first stars of the Ram to the west of the meridian.

On the 18th is full Moon, at half past six in the evening, and she rises below the Pleiades, but to the east of the line between these stars and Menkar. Before she attains a great height, it will be evidently seen, that she is directing her course through the Hyades; and, in the morning of the 19th, she passes over one of them, the third of the Bull, which suffers an occultation, at seventeen minutes and a half past six, the star being twelve minutes south of the centre; and it emerges at fifty-six minutes and a half past six, the star being ten minutes and a quarter south of the centre, but she does not reach Aldebaran before Sun-rise. At night she rises under, and to the east of Aldebaran, having passed this star before noon, and she directs her course to the thirteenth of the Twins. On the 20th, she rises below the seventh and twelfth of the Twins, the thirteenth being to the east of her, but she does not pass this star till soon after Sun-rise. On the 21st, she is seen between the third and the two first of the Twins, passing the sixth at forty-six minutes past nine. On the 22d, she rises under the two first of the Twins, nearly in a line with them; and during the night, we shall notice the second, the nautical star, as being nearest to her. She will be seen to direct her course to the first of the Lion, and to the east of her Jupiter cannot fail of being noticed. On the 23d, she rises nearly with Jupiter; and her progress from this planet, during the night, will excite attention.

On the 24th, the Moon rises under Jupiter, who is now at a considerable distance from her; and we shall note, during the night, her approaches to the first of the Lion, but she does not reach him before Sun-rise, before which time, Mars and Venus, at a considerable distance to the east of her, will be compared together by many observers. On the 25th, she rises under the first of the Lion, having passed the ecliptick very early in the morning, in her ascending node, but, for obvious reasons, without an eclipse; and in the morning of the 26th, we shall note her progress from this star, and direction towards the planets Mars and Venus. On the 27th, she rises in the morning under the constellation of the Lion, and is seen to the west of the five stars in triangle of the Virgin. On the 28th, she rises above the third of the Virgin; and, to the east of her, before Sun-rise, Mars, Venus, and the first of the Virgin, forming a beautiful groupe, will command our attention. On the 29th, she rises under the five stars in triangle of the Virgin, and with the first of this constellation, Mars, and Venus, forms afterwards a striking groupe. On the 30th, she rises nearly with the first of the Virgin and Mars, and is soon followed by Venus; and these four objects, by their varying brightness, and the change in their positions, will delight the morning traveller.

Mercury is an evening star, but in unfavourable signs, the eighth and ninth, and with a southern latitude; so that, at first, from his nearness to the Sun, and afterwards his nearness to the horizon, he will not be seen but by very keen astronomers. The Moon passes him on the 4th.

Venus is the bright morning star. She has a direct motion, this month, through thirty-five degrees, commencing with the second of the Virgin, and ending at a point nearly four degrees from the tenth of this constellation, being to the west of this star. On the 1st, she passes the second of the Virgin, the star being twenty-two minutes south of her. At Sun-rise, therefore, she is near the lower borders of the middle region, in the south-east. Jupiter being at some distance from the meridian in the west. An hour before this time, Jupiter, near the meridian, Venus and Mars in the upper part of the lower region, will give a splendour to the eastern hemisphere. For the greater part of the month, the progress of Venus towards Mars, will afford an ever varying sight to the early riser. On the 8th, she passes the seventh of the Virgin, this star being five minutes south of her. From this point she directs her course under the third to the eighth, which star she passes on the 20th, being eleven minutes to the north of it; and the groupe formed by Venus, the first of the Virgin, and Mars, will be noticed. It is now evident that she will soon pass Mars; and this event takes place on the 24th, when she is fifty-nine minutes and three quarters to the north of him, the two planets being now above the nautical star, Spica. The distance between the planets now daily increases, till, at the end of the month, it is three degrees. The Moon passes her on the 30th.

Mars is a morning star, and has a direct motion through nearly nineteen degrees, being on the 1st to the west of the seventh of the Virgin, and on the last day midway between the first and tenth of this constellation. On the 16th, he passes by the eighth, the star that Venus passes on the 16th, but the star is forty minutes north of him, whereas Venus passes it at the distance of only eleven seconds, and in an opposite direction. Thus the difference of their tracts is very apparent. Venus passes him on the 24th, being nearly a degree above him, and he passes Spica two days after. His stay above the horizon, before Sun-rise on the 1st, is above three hours, and this duration is daily increasing. The Moon passes him on the 29th.

Jupiter rises between eleven and twelve in the morning of the 1st, and every day earlier. On the 25th he is stationary, having, to that day, a direct motion through somewhat more than three quarters of a degree, in the barren space near the eastern border of the Crab; on the 20th, he is on the meridian at five in the morning; and during the whole month, his long stay above the horizon, from his rising to Sun-rise, will give great facilities to the observers of his moons and his belts. The earlier riser will frequently note the line drawn from him to the eastern horizon, adorned by the two planets, Venus, Mars, and the two nautical stars, the first of the

Lion and the first of the Virgin. The Moon passes Jupiter on the 23d.

Saturn is on the meridian on the 1st at fifty minutes past three in the afternoon, and on the 19th, at three quarters past two; and as his path from the meridian to the horizon is nearly the same as that of the Sun, at his lowest point in the ecliptick, we see him at the first low in the lower region, and every evening later at the same hour. His motion is direct through three degrees, being on the 1st above the eleventh of the Archer, and about three degrees from it, but at a greater distance from the twelfth to the west of him; and he finishes his course in the barren space to the east of the Milky-way, having the small stars in the head of the Archer about four degrees from him to the east. The Moon passes him on the 8th.

Herschell is in conjunction with the Sun on the 16th, and will not be sufficiently disengaged from the Sun's rays at any time for observation.

The Sun's apparent diameter, on the 1st, is thirty-two minutes nineteen seconds; and on the

19th, thirty-two minutes twenty-seven seconds. The Moon's apparent diameter, on the 3d, is twenty-nine minutes twenty-eight seconds; and it increases to the 17th, being then thirty-three minutes twenty-six seconds; from this time it decreases to the noon of the 30th, being then twenty-nine minutes and a half in magnitude.

The appearances of the fixed stars, at any hour of the night, will be known by consulting the positions described in the volume for 1806, according to the following table.

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
VIII.	5	6	4	39	4	7		
IX.	7	9	6	42	6	10	5	36
X.	9	4	8	37	8	5	7	31
XI.	11	5	10	38	10	6	9	32
XII.	1	11	0	44	0	12	11	38
I.	3	1	2	34	2	2	1	28
II.	5	4	4	37	4	5	3	31
III.	6	53	6	26	5	54	5	20

DECEMBER, 1812.

THE nautical stars this month are the first of the Ram, Aldebaran, the second of the Twins, the first of the Lion, of the Virgin, of the Eagle, of Pegasus, and Fomalhaut. The latter star will frequently call our attention to the south, as at six in the evening of the 1st, it is with its companions in a very favourable position, and of course, for an hour before and after that time, will be presented to us to advantage. At seven you will remember what was observed, last month*, on the four stars in Square and the nautical stars, visible when they are on the meridian. At nine the first of the Ram is on the meridian, and during the whole month will be seen in that position, at times convenient for our observation, as marked in the table for the eleventh position. You will remember what was said last month on the nautical stars above

* Page 175.

the horizon with this star*, and the length of the night affords you opportunities of seeing them in very different positions.

At the close of the month the Pleiades are on the meridian at nine, and later at other times, according to the table for the twelfth position. You have then two nautical stars to the west, and three to the east of the meridian. The first of Pegasus in the west, the lowest of the four stars in Square, will, in this position, be noticed, and you will readily see how easily it is distinguished from the other stars. The first of the Ram, between them and the Pleiades, being the only star of the second magnitude in that quarter, must, after such frequent notices of it, be clearly known, and easily pointed out to others. Aldebaran near to and to the east of the meridian, and Regulus, as near to the horizon in east by north, will be known without difficulty; and the Twins, in midheaven in the east, having no similar stars around them, must fix our attention, and, by what has been before observed, you will know the nautical star of them, by its being the lowest of the two and nearest to Regulus.

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* Page 176.

The nautical stars have now come so often under your observation, that if you have availed yourself of the opportunities, when you might have discovered them, and learned the marks, by which they are distinguished, you cannot hereafter be ignorant of them, in whatever climate you may be, or in whatever part of the heavens they may appear. A mother, also, whose son is intended to traverse the seas and oceans, wafting the products of various regions, and promoting the commercial interests of mankind, may prepare him easily for a branch of knowledge of great importance in his future life. The scientifick calculation he may learn under other tutors; the practical part he will soon be master of on board of ship; but in a distant region, in the calmness of a starry night, how pleasing will be the rising of those stars, which bring to his mind the early instructions of an affectionate mother!

The order, in which these nautical stars appear, affords also an easy way to distinguish them; and this may be taught in a pleasing manner at home, and so as to render it familiar to the young sailer abroad. At midnight we know the position nearly of the Sun under us, by knowing the sign in which the Sun is on that night, and thence counting six signs, we know the sign that is on our meridian. In the same manner, at any hour of the night and morning, when the Sun is under the horizon, we can tell the sign, that is in the opposite part of the heavens above us. By connecting, therefore, each nautical star with some sign, we shall easily know where, and at what time of the night and morn, it will be above our horizon.

The Sun entered the first sign on the 20th of March this year, and near that day in each successive month it enters each successive sign. We may then retain an ancient method of denominating the months, for at one time the year began in March, and this was the beginning of the sacred year of the sons of Israel. This is seen also in the names of our own months, September, October, November, December, which are derived from the Latin words Septem, Octo, Novem, Decem, meaning seven, eight, nine, and ten. Of course, there will be no difficulty in knowing the place of the Sun in these months, namely, in the seventh, eighth, ninth, and tenth signs. Knowing this, we shall find no difficulty in recollecting that in January and February the Sun will be in the eleventh and twelfth signs. Proceeding from March, we shall give the second, third, fourth, fifth, and sixth signs, to April, May, June, July, and August.

We have now only to consider the signs in or near which are the nautical stars, taking first the zodiacal ones. The first of the Ram, is in the beginning of the second sign; Aldebaran, of the third sign; the second of the Twins, near the middle of the fourth sign; the first of the Lion, near the end of the fifth sign; of the Virgin, two thirds of the seventh sign; Antares, in the first third of the ninth sign. The other nautical stars not being in the zodiack, we may consider them as connected with those signs, that are at the same time on the meridian with them. There are three only of these stars, namely, the first of the Eagle, of Pegasus, and Fomalhaut. The first of the Eagle is on the meridian at the same time nearly with the first of the eleventh sign, or with the two first stars of the Goat; the first of Pegasus and Fomalhaut are on the meridian nearly at the same time with the middle of the twelfth sign.

An easy way to place these stars in our imagination, is, to take their position at midnight.

Thus we will take at random a day, say the 10th of November. The Sun, therefore, is beyond the middle of the eighth sign; of course, when it is midnight, the middle of the second sign is on the meridian, and the former part of it is to the west, and the third sign to the east of the meridian. In the second sign is the nautical star, the first of the Ram, which must be, therefore, to the west of the meridian; and in the third sign is Aldebaran, which will be to the east of it. We look for the first of Pegasus in the western, and the two Twins in the eastern hemisphere. In the earlier part of the evening, the first of the Ram will be to the east, and the first of Pegasus near the meridian, which will bring us the first of the Eagle into the western hemisphere. They who have a celestial globe will do well to exercise themselves frequently, in telling, beforehand, what nautical stars are above the horizon at midnight, and then fixing the globe, in the proper way, to verify their assertions. A very few exercises, in this manner, will give a complete facility in determining the places of the nautical stars at any hour of the night.

We cannot quit this subject without paying due honour to the memory of that illustrious astronomer, to whom we are indebted for the calculation, through a long series of years, of the Moon's distance from these nautical stars, at certain hours of every day, by which means, the longitude of a ship at sea, whence the Moon was perceived, might be discovered. But Dr. Maskelyne has not only raised the character of this country, by the publication which he gave annually to the world, and to which the French confessed their annual obligations: he had the merit of duly appreciating himself the value of his labours; and, far from being carried into the regions of infidelity, by a greater insight into the powerful works of God, he was the more humbled in his own estimation, and the more intent on ascribing all the glory to the great Creater. In this, he was a remarkable contrast to the celebrated French astronomer, De la Lande, who made a boast of his departure from God, and his idle belief in a vain materialism. Let not this, however, excite wonder. De la Lande, the atheist, commenced by being a bigot. When Dr. Maskelyne paid him the first visit, on his coming to England, (I have it from the doctor himself,) the French astronomer hurried away to pay his adorations at the mass: and as in England there was no necessity for his being seen in such a situation, there cannot be a doubt, that his mind was impressed with the obligation of performing, in this manner, his devotions. But we cannot give him credit for having ever studied religion: he had not read it in the example, and precepts of our Saviour. Rejecting the superstition of his youth, he did not apply to the sources of true knowledge; and he left the world the melancholy instance of talents, claiming the admiration of mankind, but losing all their praise by not being dedicated to the glory of our God.

Two planets only are above the horizon in the evening, after Sun-set, Saturn and Mercury; but both so low, that they will attract little attention. Jupiter is seen during the greater part of the night: Mars, Venus, and Herschell, are morning stars.

The Moon is new on the 4th, at forty minutes before one in the morning, but without an eclipse, as she is four degrees and a half north of the ecliptick. On the 6th, her crescent is seen in the evening above the small stars in the head of the Archer, and below the two first stars of the Goat. On the 7th, she is still seen under the two first stars of the Goat, but to have approached much nearer to them, and evidently soon to pass them, though not for some hours after she ceases to be visible. On the 8th, the two first stars of the Goat are to the west of her, and she is seen between them and the four small stars in the tail, but nearer to the latter stars. On the 9th, she is on the meridian at thirty-nine minutes past four, having above her the first of the Water-bearer, to the east of which are the four small stars in triangle, and below her the small stars in the tail of the Goat. She passed the ecliptick, soon after noon, in her descending node; but, for obvious reasons, without an eclipse. On the 10th, she is on the meridian at half past five, having, near the meridian to the east, above her the two western of the four stars in Square, and below her Fomalhaut; the two nautical stars being now clearly noticed, the first of Pegasus, the nearest above her, and Fomalhaut, of the first magnitude, near the horizon below her. At twenty-seven minutes past seven she passes the eleventh of the Water-bearer, the star in the western bank of the stream. On the 11th, she is on the meridian at twenty minutes past six, the four stars in Square being above her, the two western to the west, and the two eastern to the east of the meridian. We shall now distinguish our nautical star, the first of Pegasus, not only as being the lowest of the two western stars, but by the stars around it, making thus so different an appearance from that of the other stars. On the 12th, she is on the meridian at ten minutes past seven, the four stars in Square being above her, but to the west of the meridian. On the 13th, she is on the meridian at two minutes past eight, the three first stars of the Ram being above her to the east of the meridian; and at twenty-four minutes past ten she passes the thirteenth of the Fishes, the star in the band between the Fishes. On the 14th, she is on the meridian at fifty-five minutes past eight, having above her the three first stars of the Ram to the west, and below her Menkar, with the small stars in the head of the Whale, to the east of the meridian. Before she sets, she passes over the twelfth of the Whale. The occultation takes place on the morning of the 15th, at eleven minutes and three quarters past two the star being four minutes and three quarters south of the centre; and it ends at six minutes and three quarters past three, the star being three minutes and a sixth south of it.

In the evening of the 15th, the Moon is on the meridian at fifty-one minutes past nine, having above her the Pleiades to the east, and below her Menkar and the small stars in the head of the Whale to the west of the meridian. At thirty-six minutes past seven the star called *f* of the Bull suffered an occultation, the star being nine minutes and a quarter south of the centre; and it emerges at twenty-nine minutes and a half past eight, the star being eleven minutes and a half south of the centre. On the 16th, she is on the meridian at forty-eight minutes past ten, Aldebaran being at this moment eclipsed by her. Her passage through the Hyades will excite attention: she passes the first fourth at thirty-seven minutes past five, the second fourth at two minutes past six, and Aldebaran is hid at forty-seven minutes and a half past nine, the star being one minute north of the centre; and it emerges at fifty-nine minutes and a quarter past ten, being then two minutes south of the centre. On the 17th, she is on the meridian at forty-seven minutes past eleven, being now near the sixth of the Bull, and directly over Orion, having travelled very rapidly from Aldebaran. On the 18th is full Moon, at twenty-three minutes past five in the morning, but without an eclipse, as she is upwards of four degrees south of the ecliptick. At night she rises under the seventh and twelfth of the Twins, and above the thirteenth, as she passes this star at thirty-four minutes past six.

On the 19th, the Moon rises under the line between the third and the two first stars of the Twins, and we shall perceive that she is directing her course to Jupiter. On the 20th, she is followed very soon after her rising by the planet; and her progress by him, during the night, will gratify many observers. She passes him before Sun-rise. On the 21st, she rises under Jupiter, and is perceived to be directing her course towards the first of the Lion, the planet, the Moon, and this star, forming a very pleasing object for observation. On the 22d, she rises under the first of the Lion, as she passed this star at four in the afternoon, and is perceived to direct her course to the seventeenth of this constellation. She passed the ecliptick in the morning, in her ascending node, but, for obvious reasons, without an eclipse. On the 23d, she rises under the seventeenth of the Lion, having passed the star at twenty-one minutes past four in the morning. On the 24th, she rises below the second of the Lion, and is followed by the second of the Virgin, thus heading the five stars in triangle; but she soon passes this star, and, during the morning of the 25th, is seen to direct her course to the third of the Virgin.

On the 26th, the Moon rises in the morning under the third of the Virgin, having passed this star about three hours ago, and during the morn she is seen between the first and the five stars in triangle, Mars being considerably to the east of her. On the 27th, she rises with the first of the Virgin, and recedes from her towards the tenth of this constellation, and above Mars. On the 28th, she rises under the tenth and eleventh of the Virgin, and is followed by Mars and the two first stars of the Balance. The planet she will evidently pass before her next appearance. On the 29th, she rises under the two first stars of the Balance and Mars; and, before Sun-rise, these objects, and Venus below her, will form a beautiful groupe. On the 30th, she is followed soon after her rising by Venus and the second of the Scorpion; and on the 31st she rises under them.

Mercury is an evening star till the 29th, when he is in his inferior conjunction. On the 10th he is at his greatest elongation, and on the 20th stationary: being in the ninth and tenth signs, and with a southern latitude, he is too low at Sun-set to be visible to common observers. On the 10th, he is only eight degrees above the horizon at Sun-set, but this is height sufficient for him to be discovered, before he sets, near the south-west, under Saturn. The Moon passes him on the 6th.

Venus is a morning star, on the 1st near the upper border of the lower region, at Sun-rise, in the south-south-east. Mars is three degrees and a half from her, and the two planets, with Spica, form a beautiful groupe. Her motion is direct through thirty-seven degrees and a half, being at first to the west of the tenth of the Virgin, which star she passes on the 3d, when it is forty-five minutes north of her. From this point she travels through the space between the tenth and eleventh of the Virgin, through the barren space between that constellation and the Balance; and so through the space between the two first stars of the latter constellation, being nearest to the first, to the sixth of it. The fourth sixth she passes on the 20th, the star being sixteen minutes to the north of her. She continues her course to the second of the Scorpion, which star she passes on the 27th, being to the north of it, and distant forty-seven minutes. The next day she passes the thirteenth of this constellation, being to the north of it, and distant only seven minutes; and now the nautical star, Antares, under her, in vain endeavours to vie with her in splendour. The Moon passes her on the 30th.

Mars is a morning star, and his duration above the horizon before Sun-rise is daily increasing. He is first seen between the first and tenth of the Virgin, to the west of Venus, the distance between the two planets daily increasing. His motion is direct through twenty degrees. On the 16th, he passes the eleventh of the Virgin, the star being to the south of him, at the distance of twenty-eight minutes; and he directs his course to the first of the Balance, which star he passes on the 29th, when it is to the south of him, and distant thirty-two minutes; but he does not reach the sixths of this constellation this month. The Moon passes him on the 28th.

Jupiter is on the meridian at a quarter past four in the morning of the 1st, and at three quarters past two on that of the 21st. Being in the fifth sign, he will be visible during the greater part of the night; and at the end of the month he rises between six and seven in the evening. His motion is retrograde through little more than two degrees, towards the fourth of the Crab, and he holds the middle space between the two first of the Twins and the first of the Lion. At eleven at night of the 8th, 15th, and 31st, his first moon is eclipsed; of the 6th and 13th, the second; of the 11th, the third; of the 9th, the fourth. Our Moon passes him on the 21st.

Saturn is so near his conjunction at the end of the month, and in so unfavourable a position in the beginning, that he will be seen by very few observers. On the 1st, at Sun-set, he is little more than ten degrees above the horizon: this height is daily decreasing. The Moon passes him on the 6th.

Herschell is a morning star, about eight degrees above the horizon at Sun-rise on the 1st, and this height is daily increasing. On the 8th, he passes the tenth of the Balance, the star being distant only thirteen minutes from him to the south; and he moves with a direct motion a little more than a degree from this star. The Moon passes him on the 2d.

The Sun's apparent diameter, on the 1st, is thirty-two minutes thirty-one seconds; and, on the 19th, thirty-two minutes thirty-four seconds. The Moon's apparent diameter increases to the 16th, when it is thirty-three minutes two seconds; thence it decreases to the 28th, to twenty-nine minutes thirty-six seconds; and then it increases to the end of the month, closing with a magnitude of thirty minutes twelve seconds.

The appearances of the fixed stars, at any time of the night, will be known by consulting the volume for 1806, according to the following table of positions.

TABLE OF POSITIONS.

Pos.	1		8		17		25	
	h.	m.	h.	m.	h.	m.	h.	m.
IX.	5	6	4	36	3	56	3	20
X.	7	1	6	31	5	51	5	15
XI.	9	2	8	32	7	52	7	16
XII.	11	8	10	38	9	58	9	22
I.	0	58	0	28	11	48	11	12
II.	3	1	2	31	1	54	1	15
III.	4	50	4	20	3	40	3	4
IV.	7	11	6	41	6	1	5	25
V.			8	32	7	52	7	16

HAVING thus come to the conclusion of another year, I may be permitted perhaps to hazard an opinion on the movements of the great bodies, which have so often come under our contemplation. Certain facts are laid down with respect to some of the bodies in our system; namely, that the Sun has a motion, the planets and comets have a motion round the Sun; and around certain planets, bodies called moons perform their motions. Between the orbits of the planets and the Sun immense empty spaces are supposed to exist, and the motions of the planets are said to be kept up by means of a power called Gravity, with which matter is supposed to be endued. According to this opinion, every particle of matter is endued with a power, which acts to an indefinite distance, so that, by their combined energy, the Sun, Moon, and planets mutually attract each other.

This idea of matter being invested with such an active power, seems to rest on a very unsteady foundation, and it is easier said than conceived, that, while I am writing in my chair, my chair, as well as myself, is exerting an influence, in conjunction with other chairs and men and the particles of the earth, in drawing the Moon towards us. I feel a difficulty in conceiving this. I can conceive a ship and boat drawn nearer to each other by a rope, pulled by persons in each vessel: but I cannot conceive an earth drawing a moon, since I have not the least idea of any thing connecting the two bodies together. Besides, I cannot attribute to matter the active powers, with which many persons are inclined to think, that it is invested.

Not being able, then, to conceive that the force of attraction has any existence, I am naturally led to some other mode of explaining the appearances of nature. The following scheme may appear to a few persons not entirely devoid of probability, and may lead others to examine more attentively their own notions upon these subjects.

I do not imagine, that the space around the Sun, to the extremities of the system, is a void, occupied, only in a few places, by planets, comets, and moons, or light: but, on the contrary, that it is filled with matter, with whose density I am not acquainted. The late discoveries on what are called airs, convince us that we are far from knowing the extent to which matter may be attenuated, and this fluid may be ten or ten-thousand times rarer than the air at the remotest part of the hemisphere. The Sun, by its motion, and from its very great magnitude, must produce a great motion in the particles of matter around it to supply the space, which it previously occupied: and thus there will be a constant stream of particles to occupy the space left by the Sun. This motion will occasion a motion in the particles behind, above, and below it, and so on to the extremities of the system. The earth, then, being always in the streams of matter, verging towards the Sun, will be affected by them, and impelled in their direction, and so will every planet or comet, and the motion of the earth in the direction of the tangent to its orbit, combined with the pressure of the matter tending towards the Sun, will produce the curvilinear motion, which it is perceived to possess. I need not observe here, that the force with which the planets are acted upon, may, according to this scheme, follow the law assigned to gravity, or that of the inverse square of the distance.

If this scheme should appear plausible to any one, as far as the planets or comets are concerned, it will be asked, How can the moons perform their motions, since, instead of going round the earth, they will move in the stream towards the Sun, when the motion in their orbits is in that direction? To which I reply, that, if my opinion is allowed, respecting the cause of the motion of the earth, there will be no difficulty in reconciling to it that of the Moon's. For, as there is a stream of matter to fill up the space left by the Sun, there will also be a stream towards the spaces left by the earth, and the Moon being always in it will be carried towards the earth in the same manner, as the earth is carried towards the Sun.

It will not be necessary to enter into an explanation of the action of the stream of matter to or from the Sun, in every part of the earth's orbit, or that to or from the earth in the Moon's orbit, the scheme will be easily understood from the description. The mathematicians, indeed, may find amusement, by supposing bodies like the Sun and planets, placed in different mediums of matter, in their present relative situations; and bulks, and distances, and tracing out the orbits, that would be described by them. Whether this will lead to the discovery of the nature of the medium, which fills our system, is more than I can prognosticate.

The difference between the system, now described, and that generally adopted, is, that in the one all the motions are performed by impulse or pressure in a manner suited to my notions of matter, as an inert substance; in the other, they are performed by ascribing to matter such powers as do not appear to me to exist in it. The reader will choose between them; and, if he adopts mine, he will be naturally led to consider farther, how this ambient matter not only keeps the atmosphere pressed to the earth, but also pierces through it, and produces those effects, which are usually ascribed to gravitation.

APPENDIX.

ON THE DISTANCE OF THE FIXED STARS.

THE distance of the fixed stars has occupied the attention of many eminent practical astronomers. That it must be very great was obvious, from no change being perceived in the height of the stars, when viewed from the opposite sides of the earth's orbit. The improvement in instruments did not hold out any hopes of their distance being measured; but the charm is broken, and we may now expect, that, by dint of continued application, this question will be established on deductions from a vast variety of observations. Two eminent astronomers, Piezzi in Sicily, and Brinkley in Ireland, have employed themselves on this difficult subject. The latter took the first of the Harp for the star, by which he was to discover, whether any real difference could be perceived in the position of a star from the change of place in the earth, and he has discovered the angle which the radius of the earth's orbit subtends at that star, to be not less than two seconds, nor little more than two seconds and a half, not more than 2″ 52.

Supposing, then, the angle subtended at the star by the radius of the earth's orbit to be two seconds, or two seconds and a half, we may thence determine, in this manner, the distance of the star.

1. Let the angle be an angle of two seconds. Then since two seconds are one thirtieth of a minute, a minute a sixtieth of a degree, a degree a three hundred and sixtieth of the circumference of a circle, the semidiameter of the earth's orbit will be this part of the circumference of a circle, whose radius is the distance of the star from the earth. The circumference of that circle will be, therefore, three hundred and sixty times sixty times thirty times the semidiameter of the earth's orbit. Now the semidiameter, or the mean distance of the earth from the Sun, is ninety-five millions of miles; and, by multiplying this number into the preceding numbers, we obtain in miles the circumference of the circle in question. But the circumference of the circle is more than six times and two tenths, and less than six times and three tenths

the radius, being very nearly equal to 6.28318 times the radius. Consequently, if we divide the above number by 6.28318, we shall have the distance of the fixed star from the earth in miles.

Circumference $= 30 \times 60 \times 360 \times 95{,}000{,}000$

Radius $= \dfrac{30 \times 60 \times 360 \times 95{,}000{,}000}{6.28318} =$

distance of the star from the earth.

2. If we take the angle at two seconds and a half, then the circumference of the circle, whose raidus is the distance of the star from the earth, will be three hundred and sixty times sixty times twenty-four times the radius of the earth's orbit. And this number divided by 6.28318, will give the distance of the fixed star from the earth in miles.

Circumference $= 24 \times 60 \times 360 \times 95{,}000{,}000$

Radius $= \dfrac{24 \times 60 \times 360 \times 95{,}000{,}000}{6.28318}$

Now either of these numbers are far beyond what enter into the calculations of the generality of readers, and to bring them into somewhat of a narrower compass, we will take the radius not in miles, but in semidiameters of the earth's orbit;

and then for our first position we have only to multiply thirty into sixty into three hundred and sixty, and divide the product by 6.28318; for the second position we multiply twenty-four into sixty into three hundred and sixty, and divide the product by 6.28318.

According to the first position, the distance of the first of the first of the Harp from the earth is six hundred and forty-eight thousand times the semidiameter of the earth's orbit. By the latter position, the distance is five hundred and eighteen thousand four hundred times the mean distance of the earth from the Sun.

We may, therefore, conclude, that the distance of this fixed star is not less than four hundred thousand times the mean distance of the earth from the Sun; and, till farther observations give us a nearer distance for any star, we may for the present lay it down, that no one is nearer to us than this number. But in such a question, we may wish for some limit, within which the possibility of errour is very much diminished, and we cannot suppose that, if the angle subtended by the mean distance of the earth from the Sun had been ten seconds, it would not have been detected by our able astronomers. Let us suppose it, then, to be ten seconds, and thence determine the distance of the earth from the star. This, of course, would now be six times sixty times three hundred and sixty times the mean distance of the earth from the Sun, or one hundred and twenty-nine thousand six hundred times that distance.

ON THE COMET.

Many vague notions have been been scattered abroad on the subject of the comet. Among them, one is, that these bodies are a kind of emissaries from one system to another, and have a compound motion round our Sun and a fixed star. Thus, when they get to the boundaries of our system, they are carried into the next, and, after revolving round the fixed star, come back again to our Sun. Now a fixed star cannot be less than one hundred and twenty-nine thousand six hundred times the mean distance of the earth from the Sun, and half that distance, or sixty-four thousand eight hundred semidiameters of the earth's orbit, will then be the extent of our system. According to the law discovered by

Kepler, the least time employed by a comet to reach the extent of our system would be two million nine hundred and sixteen thousand years, and allowing the same number of years for it to reach the star, the want of analogy between the periodical times of the comets and the planets, will suffice for the rejection of this system. It must be confessed, however, that this contemplation may excite some apprehension, that the fixed stars may be nearer to us than the present observations allow.

An influence on the weather was attributed to the comet, but the persons who held this opinion, did not sufficiently consider, that, if this had been the case, the same cause would have operated throughout the same parallel of latitude. This little island, however, afforded sufficient diversity of weathers, at the same time, to overthrow this opinion.

It was once held that comets were fiery matter, and the degree of heat they acquired in consequence of their approach to the Sun, was calculated and compared with that of red-hot iron. But the comet we have lately seen, exhibited the same appearances as the others; and, so far from acquiring such a prodigious degree of heat, there is no reason to believe, as far as the rays of the Sun are concerned, that its inhabitants felt more warmth than those of this earth. Besides, we are not sufficiently acquainted with heat to determine how far a body is affected in this respect by its distance from the Sun; and it is not certain that such a thing as fire exists in either planets or comets.

What then are the comets? Let it first be answered what the planets are, and this question may then be put. We have not the least conception of what the Moon and planets are composed. Matter is capable of endless varieties, and we, who know not what is twenty miles under our feet, are not likely ever to know the texture of a body, so near to us as the Moon, much less that of the planets and comets. All that we can discover of them is, that they, in the immense medium, are carried round the Sun upon the same plan as the planets, only in orbits of greater inclination in general to that of our earth, and with longer periodical times. The tail that accompanies them marks out a specific difference between them and the planets; but in what it consists the most sagacious among us in vain attempt to discover. Their appearance, however, is calculated to raise the thoughts of grovelling mortals to Him who directs the motions of all the heavenly bodies, whether suns, stars, planets, or comets; and without whose pervading influence, neither the origin nor the continuance of their motions could be conceived to exist.

On the orbit of this comet the most eminent astronomers are employed, and the long duration of its appearance afforded ample means for directing their researches. One observation came to England in an East Indiaman, which is of great importance; for in that the comet was seen at eight in the evening, on April 19th, in the southern latitude, 29° 54′, and in east longitude, 40° 9′, when its distances were taken from Sirius and Procyon, being then fifteen degrees and a half from the former, and fifteen degrees from the latter star.

A friend has favoured me with his calculations as they stood from various observations, and according to them the comet passed its perihelion on the 10th September, its longitude being 75° 17′, the inclination of the orbit 75°, the node

139° 17′. The nearest distance of the comet from the Sun, is equal to one mean distance of the earth from the Sun, and seventy-one thousandth parts of that distance.

ON THE APPELLATIONS OF NUMBER.

As the numbers which astronomy presents to us very much exceed those in common use, it may be well to accustom ourselves to the easy method of naming them, which attention to the present nomenclature suggests. The national debt of this country has given a facility to the ideas of millions, and it may familiarise us, in due time, to the term of billions, which will be discovered by converting the debt into shillings. Thus, as we proceed from units to thousands, from thousands to millions, from millions to billions, we may go on to trillions, quadrillions, &c. &c.

10	000	000	000	000	000
Quadrillion	Trillion	Billion	Million	Thousand	Unit

Thus we may give a name to any number: and I have proposed this question to several mathematicians; to name the number, which has a unit followed by ten millions of ciphers. My readers may exercise themselves upon it for a few minutes, and they may calculate the time they should be making as many dots upon paper, as there are units in this number, supposing them to make a hundred dots in a second.

OBLIQUITY OF THE ECLIPTICK.

This obliquity has been stated wrong in the Nautical Almanack for this year, but properly for the year 1813.

For the year 1812 it is on

1st January,	23° 27′ 41″, 2
1st April,	23° 27′ 42″, 2
1st July,	23° 27′ 41″, 5
1st October,	23° 27′ 42″, 7
31st December,	23° 27′ 42″, 3

Thus it is given in the French Connoissance des Tems; but they have not calculated upon this obtiquity, for they make the declination of the Sun, on the 21st of June, 23° 27′ 34″, exactly the same as it is in our Nautical Almanack. The reader, who refers back to the volume for last year, page 115, will not be surprised at this circumstance; but the astronomical world will regret, that, after the so much boasted improvements of the French, they cannot, or at least do not, make their own calculations for the heavenly bodies. A similar examination of the mathematical pretensions of our neighbours, might tend to show, that they have not made the rapid progress in science, that is assumed by them, and easily conceded to them by those who do not read their works.

THE END.

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